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Editorial.

ON UNSUSPECTED INFECTION.

If the question of the amount and virulence of unsuspected infection could be truly and fully answered, there is no doubt that we should be startled and probably appalled by the discovery.

It is true only some divine power could reveal the whole matter to us, but we may endeavour to find out *some* of the sources from which the malignant influences emanate, and by patient investigation and careful reasoning determine how these are to be met and thwarted, so that the causes of human misery may be to a certain extent reduced. At the present moment we are certain that sufficient care is not taken by those in authority to prevent infection, even from sources that to the veterinary mind are very suspicious; but public officials—in their public capacity at least—seem to be endowed with an obtuseness, a thickness of skin, which is almost impenetrable. In private they are doubtless most estimable persons, and may possess a very considerable knowledge of scientific affairs, but this knowledge either deserts them when they assume their official robes, or else the instructions from headquarters have a paralysing influence, or, finally, the malignant power of commercialism—the supposed need of enriching a few individuals, often quite worthless, at the expense of the community—blunts and stupefies their perceptions. This is very terrible when we are dealing with the known and avoidable; how much more terrible when we come to deal with the unknown and vaguely dreaded we shudder to think. Let us, however, face the problem.

There is no doubt that certain diseases are communicable from the lower animals to man; how many, veterinary science has not yet determined. Here, then, already we have an alarming state of affairs: diseases which we suppose to be incapable of crossing the barrier may perchance be capable, yet here the tendency of the official mind is to treat the matter with unconcern. Then, further, we have to admit the possibility that even the suspected diseases may come to us by unsuspected channels; thus, we wish to point out, our enemies may prove at once to be more numerous and more artful and insidious than we imagined. Let us take for illustration the possibilities connected with two deadly diseases, glanders and anthrax. We venture to say that these diseases are

being communicated to the human subject every day, and yet, perhaps, in the first instance, not in one case out of every ten is the effect traced to the cause. Medical men are puzzled with the symptoms, having never, perhaps, seen the disease in the horse, its natural breeding-ground, in spite of the many opportunities they obtain. By way of proof, the writer remembers in this connection talking on infection and contagion to a physician in a northern town some years ago, and learning in the course of conversation that his friend was treating a lady patient who was suffering from a mysterious affection of her lip and cheek. The writer suggested anthrax as the cause of the trouble, a butcher in the town having a short time before been convicted of selling the carcase of an ox suffering from this disease, but the doctor shook his head. A few days later the lady died, and the cause of death was certified as erysipelas: the writer had his own opinion on the matter. Now, we know that other diseases are treated otherwise, that when, for instance, a ship arrives in port and the captain reports that he has a case, say, of smallpox on board, the ship is put in quarantine, the patient is isolated, every Local Authority in Britain becomes alert, and all precautions are taken to prevent infection. Yet a horse suffering from glanders is permitted to go about our capital snorting disease of a deadly nature wherever it goes. Is this reasonable? Is it not pure madness?

In considering the possibilities of infection by anthrax. we fear that even professional readers hardly realise how numerous these are. We import from America huge quantities of wool, cotton, cotton seed, and cotton cakes, raw hides, and rice, which have not been in any way disinfected, and which may consequently be teeming, for all we know, with anthrax, and not only with anthrax but with smallpox and other horrible diseases. When the writer was in America, living in the State of Louisiana, he had ample opportunities of learning how disease is spread. Farmers and stock-breeders, he found, thought little of the loss of a few *hundred* head of cattle per annum from anthrax. In many of the States there is no Contagious Diseases (Animals) Act, and consequently there is no proper control of disease, Cremation is a thing unknown. "Into the Mississippi with them" is the fiat, and there the carcases float, oozing virulent material, and the waters of the river spread over the fields in times of flood, and a rich crop of cotton—and disease—is the result. Why cannot our Foreign Office or the Board of Trade or Agriculture take up the matter with the American Government, and endeavour to put an end to this awful waste of life, this frightful destruction of the wealth of the two nations?

Let us revert for a moment to glanders, which exists, as we have said, plentifully in London. It must be remembered, and this may explain, though it does not excuse, the callousness of the authorities, that the manifestation and symptoms of the disease

differ in the horse and in man. We feel certain that many people die of glanders, but their deaths are attributed to other causes, so that the deadliness of the disease is masked; we have heard of a case described as "acute rheumatic synovitis" which was really a case of glanders. We would suggest, as a remedy or temporary mitigation, that the medical profession should regard all acute suppurative diseases in their patients with grave suspicion, and get a microscopic examination of the pus made by some one who is an expert in detecting the organism of glanders. Even then, of course, we should not be able to trace all cases of infection, as many men die of mysterious diseases in which there is no external indication of pus formation, and no post-mortem examination made, and yet the disease is probably glanders. Still, it would be a step in the right direction, and might put us on the track of many evils; we might learn what other symptoms accompany the disease, and we might trace the source of infection in the horse and finally destroy it.

Original Papers.

INJURIES OF THE DOMESTIC ANIMALS IN THEIR LEGAL ASPECT.

BY LIEUT.-COLONEL J. A. NUNN, ARMY VETERINARY DEPARTMENT.

(*Continued from page* 164.)

True Burns are seen in animals from many causes, the most common of which are burning buildings, actual cautery, singeing, scalding, poultices, fomentations, and fumigations, and accidents from steam escaping from machinery.

Burns vary in degree from simple superficial inflammation to complete disintegration of the tissues, depending on the temperature to which the part is exposed and length of time, and whether it is direct or reflected; and they have been divided into many classes, but that of Baron Dupuyten appears to be the most frequently adopted, and at all events it has stood the test of time. He divides them into—1, Superficial inflammation or erythema; 2, Vesicular inflammation; 3, Suppurative inflammation, with disorganisation of the papillary portion of the skin; 4, Complete destruction of the dermis; 5, Mortification of the tissues; 6, Carbonisation of the whole or a portion of a limb.

Superficial Inflammation, or Erythema, is a slight amount of inflammation shown in animals with thin coats and absence of pigment in the skin by redness, running on into a brown-black or violet, with slight swelling and rapid desquamation of the dermis. It leaves no trace behind it.

Vesicular Inflammation.—The inflammation is acute, and vesicles form on the surface of the skin filled with a clear yellow-coloured fluid. The skin becomes infiltrated, thickened, and very sensitive. If the blister is

opened the fluid escapes, and the epidermis dries up and falls off in a few days in the form of scabs. The wound does not invariably suppurate, but if the blister is opened and the dermis exposed it generally does, and it may extend to the hair-bulbs, altering the colour of the new hairs. It sometimes is caused by the animal biting himself or rubbing the part. This point should be remembered in an action for damages, as the owner may be guilty of contributory negligence.

Suppurative Inflammation, with destruction of the papillary layer of the Skin.—In severer burns an eschar forms, which falls off about the tenth day, leaving a naked suppurating wound which cicatrises slowly, the epidermis being sloughed off in large white patches. A permanent blemish always remains of a thin greyish white cicatrical tissue that is easily torn and quite bald of hair.

Destruction of the Dermis.—When the part is exposed still longer to heat the whole of the skin is destroyed either by desiccation or carbonisation. If the burn is caused by contact with an incandescent substance such as hot iron, the eschar is of a yellowish brown colour, hard and dry like a piece of parchment, but if from a fluid (a scald), it is at first soft and of a grey colour, but dries up and assumes the same appearance as that caused by the hot iron. In both cases, however, towards the tenth day the eschar is sloughed off, leaving an open wound that is a long time healing, and then does so in an irregular fashion.

Mortification of the Soft Tissues.—The whole of the soft tissues down to the bone are converted into a large eschar. They only differ from the preceding in being larger and deeper, taking longer to heal and giving rise to greater deformity.

Carbonisation of the part.—The tissues are lessened in size and weight, turn black in colour, and are dried up—porous and brittle—the adjacent parts being in a state of high inflammation.

The Prognosis of burns should be carefully given, if not reserved, except in obviously trivial cases, as their gravity depends not only on the depth and extent but the nervous shock produced. Furthermore, if the patient lives the cicatrix may so interfere with the natural function of the part as to render him practically useless. An instance of this came under my notice many years ago in South Africa in a case I was consulted about. The animal, a racehorse, had been severely burned about the back and loins, and recovered, the wound healing up, but he was never able to freely extend himself, and never after won a race. A similar instance also occurred in a case of a scald from a burst steam pipe at the back of the knee.

Burns from Caustics.—Usually these are acids, more particularly sulphuric and nitric. Accidents of this nature are usually seen in horses employed about works where these acids are used, and the burns are on the lower parts of the limb, but there are instances of malicious injury—"vitriol throwing,"—usually in the case of dogs and cats, the burns being on the back and upper parts of the body.

Somewhat allied to this is turpentine burning, which is, as far as I know, confined to dogs—*i.e.*, pouring turpentine on the animal, setting it on fire, and letting him loose. The circumstances of the case and smell of the turpentine would lead to the forming of an opinion. Apart from cruelty such an offence would be dangerous to property, and is severely punished for both reasons.

XUM

Quicklime causes burns usually about the nose and eyes from animals smelling at it, or on the extremities of the limbs. The eschars from acids are soft and ill-defined—grey if caused by sulphuric, and yellow from nitric or hydrochloric. Alkalies cause a soft eschar that extends a considerable distance from the part that the chemical came in actual contact with. The eschars from metalic salts are opaque, hard, dry, and sharply defined.

Burning Buildings.—Expert opinion is sometimes required as to burns to animals in fires and the amount of loss sustained both by death and depreciation of the living.

In the case of death the exact cause should be fully determined. The first cause to be considered is asphyxia, from heated gas and smoke entering the lungs and preventing the blood from being properly revivified. The skin must be examined, as burns not only give rise to considerable pain and nervous shock, but the function of the skin being destroyed causes asphyxia. The lesions to be noticed are burns on the skin and those of asphyxia, very black fluid blood that quickly turns red on exposure to the air; the right side of the heart and large veins distended; engorgement of the lungs, liver, spleen, and kidneys; and injection of the mucous membranes.

If the fire has commenced with the bedding, the abdomen sheath, udder, breast, and inside the limbs will be most injured, if not, the back and loins on which burning pieces of material or the roof of the building may have fallen. The eyelids, nostrils, and lips are often severely injured, but in severe fires the bodies are often so charred as to be almost unrecognisable.

A careful examination is necessary to ascertain if there might not be some other cause of death, as the fire may be caused after the death of the animal for fraudulent purposes. If the appearances of asphyxia are present, and nothing else to be discovered, it may be assumed that the fire has been the cause of death.

The value of the dead animal is best ascertained by taking an average of those remaining, as the owner will generally consider that the lost one is the best in the stable.

Those that escape will probably have other injuries besides burns, from kicks, blows, &c. Care must be exercised, as although the skin may appear to be only slightly scorched, it may slough off, leaving a large sore, and the danger of the cicatrix interfering with the motion of a joint or some other important function, as well as the possibility of septicæmia from absorption, must be considered. The smoke may also give rise to bronchitis, pneumonia, or other lung troubles, so in all such cases it is advisable not to be in too great a hurry, but wait a reasonable time before committing oneself to an opinion.

SITUATION OF WOUNDS.

The situation of a wound is often of more importance than the way in which it has been inflicted.

Head.—Blows on the cranium rarely cause concussion of the brain in large animals, but dogs are frequently stunned, and cases are reported of the animals being subjected to epileptic fits for some time after, probably accompanied with depression of the skull and absorption of brain tissue. Blows on the poll, from falling backwards or running back and the halter breaking, are, on the contrary, one of the common causes of fracture of the base of the skull in horses.

Broken horns may be serious if the core is fractured, the sinuses of the head becoming involved in the inflammatory process. Blows on the face and jaws are much more frequent than on the skull, and cause fracture of the frontal, nasal, and maxillary bones, also the orbital arch, and give rise to the formation of pus in the sinuses.

A portion of the tongue may be lost by being cut off by the halter rope passed through the mouth or round the jaw, and cutting through it if violently jerked. In the *Presse Vétérinaire* of 1883, pages 555 and 690, there is an interesting article about this injury, in which the author denies the possibility of the tongue being cut through by the rope, and considers it is done by getting it between the incisor teeth.

The eyes and lids are injured or put out through a multitude of injuries or the clumsiness of the groom or driver.

Neck.—The usual injuries to the neck are poll-evil and fistulous wither, with or without necrosis of the cervical ligament and caries of the vertebræ.

Wounds of the carotid or jugular from bleeding are not so commonly seen as formerly, as the practice has somewhat gone out of fashion. Partial dislocation or fracture of the cervical vertebræ are not unknown, but are exceedingly rare. Cases of rupture of the trachea are on record. I have seen two, both of which were caused by coming into collision with the shaft of another vehicle.

Chest.—Most injuries are contusions, and confined to the external soft parts are not dangerous. When repeated on the wither, such as from a bad-fitting saddle, they may cause serious injury, and even with the most favourable termination put the horse out of work for some time.

Violent falls on hard ground may cause pneumonia or pleurisy, more rarely pericarditis, also fracture of the ribs. This latter accident is not serious if the pleura and lung are not injured. If the chest is not penetrated, wounds in this region are not dangerous, but if it is they are; but it is not advisable to probe them, as a non-penetrating may be easily turned into a dangerous penetrating wound, and if it is considered necessary to make an examination it is best done with the finger. If the pleura is penetrated there is a whistling sound on inspiration at the mouth of the wound. If the lung is wounded there will be a bloody discharge from the nose.

Abdomen.—Violent contusions to the abdomen may rupture the walls, although the skin remains intact, giving rise to hernia, and may be complicated by rupture of the abdominal organs, liver, spleen, stomach, &c., when the case is fatal. Kicks and non-penetrating blows from the horns of oxen are common causes of hernia.

If the skin and peritoneum are not injured, such wounds usually heal rapidly, always provided peritonitis is not set up; but penetrating wounds, although they appear to be trivial, are always dangerous, even if the viscera escape, and if they are so large as to allow them to protrude the result is more often fatal than otherwise.

In all wounds of the abdomen it is injudicious to probe the part, as no useful knowledge can be ascertained, and in the treatment much has to be left to nature.

Spine.—Violent blows in the case of small animals, falls, and muscular contraction when cast for operation, are the usual causes of broken back, which generally takes place in the lumbar or last dorsal vertebræ.

CICATRICES.

Cicatrices give important evidence in matters of insurance to identify the animal, to estimate the depreciation resulting from a wound, to form an opinion as to where the wound was inflicted, if of long standing or recent, and if there has been a previous one or not. Cicatrices are always denuded of hair, and being poorly supplied with blood-vessels easily undergo ulceration and inflammation. At first they are of a red colour and of a low resisting power, but thicken, consolidate, and turn a grey colour even in the case of dark-skinned animals. Old cicatrices are entirely composed of fibrous material.

Where there has been a considerable loss of tissue, particularly of muscle, tendon, or even bone, the cicatrices adhere firmly to them, sometimes causing distortion or interference with the function of the neighbouring parts. Small cicatrices are thick and firm, but large ones are thin and easily torn. They are indelible, and even when hair grows on them it is of a different colour to the rest of the coat.

Although cicatrices are composed of the same tissue there is some difference in them in the different classes of wound.

Incised Wounds.—The resulting cicatrice is rarely linear, generally elliptical, depending on the elasticity and tension of the skin and subcutaneous cellular tissue.

Contused Wounds.—Like those on the knee, they are generally circular and thick; on the knee they are usually bare if there has been loss of skin or tissue; if the follicles have not been completely destroyed, only bruised and injured, the hairs are altered in colour or direction of growth. Considerable care is necessary in expressing an opinion as to the loss incurred by a broken knee, as the animal may have been down before. Careful examination of both knees should, however, show if there has been a former cicatrice of previous date or not.

Cicatrices in the angle of the hock or back of the pastern from getting hung up in the head collar rope, are usually thick and raised above the skin. There may be a secretion from them which dries in scales.

Cicatrices from burns vary according to the cause; boiling fluids and fire cause large, extensive, and irregularly shaped cicatrices that are usually superficial, but caustics small deep ones with depressed centres.

WOUNDS INFLICTED DURING LIFE OR AFTER DEATH.

It is sometimes necessary to be able to distinguish between an ante- and a post-mortem wound, such as if an animal destined for food has been bled just before, directly after, or an hour or two after death. As has already been described an ante-mortem wound gapes more or less according to its size, and contractibility and tension of the tissues implicated, the lips being a pale red, covered with clotted blood, and oozing.

In a post-mortem wound inflicted several hours after death, when the circulation has ceased and the tissues no longer retractile, the tissues are pale, there is no coagulated blood, and not being contracted, the section is in a level plane.

Wounds inflicted immediately before or after death are more difficult to give an opinion upon, as the tissues are still contractile and the circulation has not stopped. In such, however, the bleeding is less and the lips are somewhat injected.

In contusions, if the skin on incision is infiltrated with blood through its entire thickness and into the areolar tissue, and if this blood is thick and coagulated, it is ante-mortem; but if, on the contrary, the skin is of normal thickness, is not injected, and the blood infiltrated into the cellular tissue fluid, the contusion is post-mortem.

The ecchymosis resulting from contusion must not be mistaken for post-mortem staining, which is a mechanical process that may be seen in any of the organs of the body, in most cases on the side on which it happens to have lain. In the first the skin is infiltrated with blood and the stain is lighter in colour at the surface than in the deeper parts; in the latter the skin is not infiltrated, and the stain is irregular in tint but clearly defined.

Ante-mortem burns are distinguished from post-mortem by the surrounding inflammation and redness of the skin, which are absent in those caused post mortem, the skin being white where it is not charred. If there are blisters the fluid in ante-mortem burns is rich, in post-mortem poor, in albumen.

Gentlemen, I must thank you for the patient way in which you have listened to a long, and I am afraid somewhat dry paper; but as most of you are practitioners in one of the most busy mercantile parts of England, from time to time you must have had experience of such matters, which I hope you will give us the benefit of. This paper is only a compilation from numerous authors on the subject, amongst whose works I have consulted:—Taylor, *Medical Jurisprudence;* Vivian Poore, *A Treatise on Medical Jurisprudence;* Lyons, *Indian Medical Jurisprudence;* Longmore, *Gunshot Injuries;* Steevenson, *Gunshot Injuries;* Esmarch, *Military Surgery;* Gallière, *Legal Veterinary Medicine;* Delorme, *Military Surgery;* Briand and Chaude, *Forensic Medicine;* and Conte's *Veterinary Jurisprudence.*

THE CURE AND PREVENTION OF BOVINE TUBERCULOSIS. SUBCUTANEOUS INJECTIONS OF OIL.

BY THOS. BASSETT KEYES, M.D., OF CHICAGO,

Chairman of the First Organisation Committee of the American Congress of Tuberculosis, and one of the Vice-Presidents of the International Congress of Tuberculosis, St. Louis, 1904.

In a recent number of the *Pacific Medical Journal,* I described my treatment of tuberculosis in man, consisting in subcutaneous injections of oil. Previous to this the lay press had given an outline of the treatment, so that a great deal of attention has been attracted to this mode of treatment, and many physicians with whom I am in correspondence report excellent results. These experiments have now been carried on for a sufficient time to say that by its means tuberculosis can be cured.

THE CURE OF CONSUMPTION BY FEEDING THE PATIENT WITH SUBCUTANEOUS INJECTIONS OF OIL, AND ITS DIGESTION BY THE WHITE GLOBULES OF THE BLOOD.

In the article referred to I said—By the method of treatment which I am about to describe in this paper, I believe that consumption can be

absolutely cured. First, however, before entering into the merits of this treatment, let us briefly consider the disease.

Tuberculosis is a disease of mal-nutrition, and while the presence of the germ confirms the diagnosis, before the germ can grow it must find a suitable soil; there must exist a pretubercular condition. It is estimated that we all breathe in a great many of these germs, but that they cannot grow in healthy well-nourished individuals. People who have consumption do not eat fats, oils, and creams in sufficient quantities. The first requisite in an attempt to cure tuberculosis has been for many years to give the patient oils of various kinds, and the most successful sanatoria of late years have adopted a process of food-forcing, using the fats of meats, butter, and cream as the principal foods to be relied upon to effect a cure, each article of diet being selected for its fat-producing and strength-giving properties. To this a vigorous out-of-door life has been advocated, because why? It promotes appetite, and the outdoor life is conducive to place the body in condition for the absorption of more fats. I was one of the first to advocate tent-life for the treatment of tuberculosis in two articles, entitled, "Camp and Outdoor Life as an Aid to the Permanent Cure of Tuberculosis," 21st February 1900; and "Some Results of Camp and Outdoor Life in Northern Wisconsin Congress of Tuberculosis," May 15-16, 1900, and some four years ago I located an out-of-door camp for the treatment of these individuals in Northern Wisconsin.

To maintain nutrition has long been considered the prime requisite of cure, and an increase of weight is an indication that nutrition is overcoming the disease, and as weight increases there comes strength, and the passing away of the other distressing symptoms, such as the products of the disease, expectoration of mucus, fever, and finally cough. Professor Osler has stated that the arrest and cure of the disease is entirely a matter of nutrition, and that the whole object of treatment is to so fortify the patient's constitution against the inroads of the disease so that the individual cells of the body have the stamina to fight against and destroy the tubercle bacillus. Regarding tuberculosis, Dr. J. H. Elliot, *Canadian Journal of Medicine and Surgery*, March 1903, says that nutrition is dependent upon the proper assimilation of food, while improvement must be proportionate to the increase in the amount assimilated. All therapeutic measures, says Mr. Macfarlan, should be devoted to the end of nutrition, and the earlier such measures are instituted the greater the prospect of cure. Without going further into the fact that the whole cure of tuberculosis up to the present time is dependent upon our ability to nourish the patient, except to say that the methods of Dettweiler, von Leyden, and Hoffman, of Germany, depend upon results from nutrition, and to this end they have advocated forced diet regardless of appetite. If the patient was to recover he must eat. Out-of-door life was important, inasmuch as it supplies to some extent the appetite.

Anorexy is one of the worst symptoms against the cure of tuberculosis. It is impossible to get the average patient to eat enough fats, and the person who has consumption is the one who leaves the fat from his meat, eats very little butter, and little of cream and milk. When a patient is far advanced in the disease he is unable on account of this loss of appetite and nausea to eat sufficient food to maintain nutrition, and therefore gradually declines as the disease advances.

In the above few words I tried to convey the importance of nutrition

in the cure of this disease, believing that the cure rests entirely on our ability to so nourish the system and stimulate the cells of the body that they will throw off the disease.

THE DIGESTIVE POWER OF THE WHITE BLOOD-CELLS.

Experiments have been conducted principally by the Italian physicians and a few others, viz. :—Gabrelschewski, *Arch. f. Exp. Path.* 1891, bd. 28; Czerny, *Arch. f. Exp. Path.* 1893, bd. 31; Levierato, *Arch. Italiano di Clinica Medica*, No. 3, 1893; Tarchetti e Paredi, *La Clinica Medica Italiana*, No. 10, 1899; Kraminer, *Berl. Klin. Woch.*, No. 6, 1890; Oliva, *Gazzetta degli Ospedali*, 17 guigno, 1900; Tarchetti, C. Sull esistenza di un fermento diastace nei corpuscoli blanche, *Gazzetta degli Ospedali*, No. 96, 1900; Sull natura e sul significato della sostenza iodofila dei globuli bianchi, *La Clinica Medica Italiana*, No. 8, 1900; Di una pretesa degenerazion amiloidea sperimentale, *La Clinica Medica Italiana*, No. 7, 1900; Richerche nulla degenerazione amiloidea spermintale, *La Clinica Medica Italiana*, No. 11, 1902; Porcile V. Sul valore semeiologico della reactione iodofila nei purulenti, *Gazzetta degli Ospedali*, Milano, No. 102, 1900, which go to show that there is a glicogenic ferment in the cells which has the power to digest starches. These experiments have been carried on principally to discover a cause for the disease of diabetes. It has been shown more or less perfectly by some of these same observers that fats also may be digested by the blood, and that the white blood cells have the power of digesting oils. Though these experiments according to Tarchetti, *Clinica Medica Italiana*, 1900, are not definite, it is clear that the white cells of the blood possess a ferment or property which has the power of digesting fats and starches, and, without going into the process, chemically phagocytic, osmotic, &c., which has been gone into by Dr. Spezia in Nos. 5 and 6 of the *Gazzetta Medica Lombarda*, 1904; for as Tarchetti, *Gazzetta degli Ospedali*, No. 28, 1904, says, it is possible to follow the rapid course of the oil injected into the internal organism and the phenomena, positively chemical, of osmosis, of phagocytosis, and of digestion intercellular.

Upon the digestion of oils by the blood I base this claim for a cure of tuberculosis. So far I have tried to show,—*1st*, that the cure of consumption must necessarily depend upon a proper supply of nutriment, the disease being primarily a disease of mal-nutrition; *2nd*, that consumptives suffer so much from loss of appetite, nausea, and perhaps non-absorption, that as a rule they are unable to take sufficient amounts of fat to overcome the disease; *3rd*, that the blood cells possess a ferment capable of digesting fats.

I shall now give my results in the cure of tuberculosis by the subcutaneous injection of oil. The oil which I have selected in the treatment of my cases has been olive oil of a very high grade, thoroughly sterilised, using olive oil in preference to other oils on account of it being non-irritating and very readily accepted by the system. The point selected for the injection has been over the shoulder blades, injecting one day over one shoulder and the next day over the other, excepting when a large amount of oil is used, when it is necessary to inject over both. There is very little pain connected with the injection, and the following day it is hardly possible to find where the injection was made. By being careful in my

technique of cleanliness and sterilisation, so far no infection has taken place, and consequently no soreness, though I believe the non-irritating properties of the oil have a great deal to do with this. The amount of oil used varies. I commence by injecting 12 cc. of oil each day, and the third day increase the amount to 24 cc. of oil. If no unpleasant symptoms arise I keep gradually increasing the dose to full tolerance of the patient, which varies with the individual and the stage of the disease. Those who are poorly nourished will sometimes assimilate large quantities of oil up to about 200 cc. daily. In this manner I have treated nine consecutive cases successfully, and within twenty-four hours after each treatment there is a remarkable benefit and amelioration of all symptoms, such as diminished morning cough, night sweats, increased strength, and finally gain in weight. Some of the very worst cases of tuberculosis under this plan of treatment have gained each day, and I believe have been thoroughly cured. The syringe which I use is an aspirating syringe reversing the piston with a thumbscrew, it requiring considerable pressure to force the oil under the skin.

By injecting oil thus it is absorbed and assimilated by the blood cells, and there is a great increase in their numbers. Thus, all the indications for the cure of tuberculosis is met. It overcomes the disease through increased phagocytosis, and thus the active cells destroy the disease. Nutrition is re-established. The time required to overcome all symptoms is remarkably short, and one will be greatly surprised at the benefits which come with treatment. Physicians should use great care in the amount of oil given, for very large doses if long continued might result in fatty degeneration of certain organs, but with the disease tuberculosis this is not so apt to occur, as tuberculosis and fatty degeneration are antagonistic. I have based the claims of this treatment as a cure for tuberculosis from my experience and clinical evidence and from my conviction. I give my results thus early, believing that the cure of tuberculosis is solved, and that by so doing many lives will be saved. Of course, to the above treatment should be added all that has been found useful in the treatment of tuberculosis, the principal of which is a forced diet of articles selected for their nutrition, such as meats, fats, butter, and cream, out-of-door life and hygiene.

I hope and trust that physicians will at once take up this method of cure, and I respectfully request that those doing so will communicate their results to me, as by broader knowledge much good may come, and it is my desire to report these results at the International Congress of Tuberculosis, to be held in St. Louis of this year.

DO SUBCUTANEOUS INJECTIONS OF OIL CURE TUBERCULOSIS?—THE ANSWER—YES.

From the results which I have obtained in the cure of tuberculosis by the subcutaneous injections of oil, and from the reports which I am receiving from many physicians who are taking up the treatment, if the question were asked—Do subcutaneous injections of oil cure tuberculosis? We could answer—Yes.

THE THERAPEUTICS OF THE METHOD.

The human organism infected at the lung with tubercle bacillus presents

these lesions. First, the infection is walled off, and the tubercle is formed from which the disease took its name long before the germ was discovered, being so characteristic of this disease, though varying in appearance in graduations corresponding with the stage of the disease, the area infected, and its association with other germs from large or small pyogenic sacs and cavities.

OIL INCREASES CELL-FORMATIONS.

Following the usual description, that when an infection of the lung takes place that the powers of the body, the blood, hurry an increased number of cells principally leucocytes to the part, there is also with the cells a connective tissue formed, derived from the nutriment of the blood, in the endeavour of the body to heal itself. The subcutaneous injections of oil meet these conditions in a remarkable way, for they increase cell growth, particularly of the leucocytes, both in number and size, and this follows almost immediately after an injection. The second condition, that of aiding in the formation of connective tissue, is also met, and, as shown in a previous paper, fats are consumed for the repair of tissue more than any other food, *i.e.*, they are converted into the various tissues as the old are worn out; they are according to this theory more essential to the healing of the diseased lung, to the replacing of old worn-out tissue, than any other material.

CONNECTIVE TISSUE WHICH HEALS AND FILLS LUNG CAVITIES DERIVED FROM THE FAT OF THE BLOOD.

If we will stop for a moment and consider the development of fat tissue we will see its relation to other closely allied tissues, and particularly to connective tissue, the tissue which fills and heals tubercular lung cavities. In the early stage of the growth of fat tissue most fat cells have the same appearance as the ordinary connective tissue cells, and I think you will bear me out in saying that it is not too far-fetched to believe that the blood loaded with increased nourishment, in the form of increased cell growth and fats, has a better chance to deposit these over-abundant cells and fats in the formation of connective tissue in the diseased lung, thus healing the affected area, the place where they would be more likely to be deposited since nature always seeks to cure herself, and as adipose tissue yields to the demands of other tissues in all diseases. By injections of oil we thus aid nature to the material for healing the lung from which she is wanting.

THEORIES OF IMMUNITY.

Let us now consider some of the theories of immunity, and, later, see how digestion of fats and injections of oil meet these theories, as they do in many particulars.

In all serum therapy, in which experiments have been vigorously carried on since Koch in 1882 published his first article relative to his discovery of the germ, it has been decided that such serums, should such a one be discovered to prevent tuberculosis, will not act so as to destroy the germ directly, but in a secondary way by stimulating to increased energy the white corpuscles of the blood, or, as Buchner puts it, that perhaps in the white corpuscle the densive power of the blood (alexin) originates, while Metschnikoff believes their action may be due to increasing

phagocytosis. How often the blood in a state of health prevents the growth of disease germs in a similar way no one would be able to compute, but it is known that even germs of the most severe diseases may be found in the secretions without having excited the disease of which they are characteristic, and it is this power which in itself constitutes immunity.

The lateral chain theory of immunity formed by Ehrlich in 1897 has been looked upon as a hypothesis of great value in explaining natural and acquired immunity, it being based upon the specific value of toxines, a distinct toxine being formed for each substance eliminated from the body, being a bactericlytic serum stimulated by the presence of one kind of germ or pathological substance, and being devoid of action upon another. Ehrlich also founds his lateral chain theory upon the mechanism by which the cells are nourished, this cellular protoplasm being very complex, with many combining functions or "lateral chains" carried on by "receptors" of various forms, and, according to its peculiar form, is able to secure by attachment the substance called "haptophores," which it can use, and for which it is said to be particularly adapted. The receptors formed for the purpose of taking up nutritious haptophores may also take up poisons and destructive haptophores, as of pathological germs, which have gained access into the system. Should this be the case, according to the hypothesis, the pathological germs may stop the nutrition of the cell and bring about its destruction; on the other hand, should the pathological substance not attach itself in a quantity sufficient to destroy the cell, it forms new receptors for taking up nutrition so that its life may be maintained. Through repeated attacks of pathological substances (pathological haptophores) the cell, in order to maintain itself, grows new receptors, greatly in excess, which are finally liberated into the plasma, and are capable of uniting with haptophores, either pathological or nutritious, and, being separated from the cell, form products of immunity, and thus animals become immune from certain poisons and pathological conditions, because their cells either lack the appropriate receptor or possess an unlimited number of them. This hypothesis is accepted as accounting for natural and acquired immunity, study and observation showing that lowered vitality of the individual lowers the immunity. As pointed out by Professor Welch in his Huxley Lecture, it was interesting to see that this theory, propounded for the purpose of explaining immunity, like the other great theory of phagocytosis, has the mechanism of cellular nutrition as its basis.

HOW FATS ASSIMILATED FROM THE INTESTINE AND OILS INJECTED SUBCUTANEOUSLY MEET THE GREAT THEORIES OF IMMUNITY IN THE CURE OF TUBERCULOSIS.

When fat is taken into the intestine it is split up into oils and assimilated mechanically, entering the blood in an emulsified or solid form by absorption through the villi of the intestine, the white blood-cells (like animals fed) being in readiness at the villi to absorb them, and being particularly abundant after a hearty meal. The process of assimilation of fats is not agreed to by all observers, and therefore not exactly understood, but that it enters the blood in an emulsified or solid form, and, under certain conditions, is deposited directly in the tissues, is assented to. With many tubercular patients the fat is not digested, but passes away with the stools, and therefore subcutaneous injections of oil should be made.

In subcutaneous injections of oil we use an oil which, because of its purity, needs no straining, and, not being in the form of fat tissues, needs no splitting into oil globules by the intestinal juices. The oil injected under the skin therefore enters the blood in a way somewhat similar, as if it were strained through the villi of the intestine. Let us notice what happens when a subcutaneous injection of oil is given. First, we observe a puffing up of the skin, because of its being raised by the oil injected, this swelling corresponding exactly to the amount of oil injected. A rosy coloured circle several inches in width at once takes place. This hyperæmia showing the blood at work, and in a period of about three hours 20 cc. of oil will have entirely disappeared, leaving no trace of where it was injected. It has been absorbed, and has gone to make new tissue and give nutriment to the blood.

An examination of the blood after a subcutaneous injection of oil shows an increased growth of its cellular constituents, both in number and size. This meets the theory of immunity as to phagocytosis; it also can be applied to the theory of immunity devised by Ehrlich, in that oils, either assimilated from the intestine or from subcutaneous injection, enter into the circulation. Now, on account of the increased amount of nutrition in the blood, the cells must develop more receptors to receive the nutrition or haptophores, and on this account receptors would be necessary to grow in excess, and thus be greater in number to combat pathological germs and to supply nutrition.

The peculiarities of the body juices of the immunised animals, and the formation in them or presence of antitoxins, amboceptors, and other antibodies, depend upon the separation of the necessary receptors from the exclusively stimulated cells, and experiments with the toxine and antitoxine reaction and the amboceptor reaction indicated that these separated receptors are able to continue their combining functions in fluids containing them. The complementary body or solvent of foreign and pathological cells is not accounted for in Ehrlich's theory, and of this we are left in doubt; but it is thought to be a property of the blood rather than a product of an antitoxine injected.

It has not been my intention to claim that oil subcutaneously injected is a true antitoxine against tuberculosis, but that it acts as such in part cannot be denied, and it meets the conditions in the theories of immunity in many ways. The digestion of fats and oils by the intestine shows why some people who live upon fats largely are naturally immune from many diseases, and particularly of tuberculosis. Clinically it is proven that when fats and oils can be digested by the tubercular patient, that they improve rapidly from the disease, and that subcutaneous injections of oil form the most valuable part of the plan of treating tuberculosis, since fats eaten may not be digested, but pass out in the stool, and oils injected under the skin must be digested.

PROOF WHICH THE BLOOD SHOWS AS TO ITS NEED OF OIL.

Proof as to the need of oil is shown by the blood of the tubercular patient. Examinations made of the blood of a great many tubercular patients was made a study by Dr. L. Applebaum, in the *Berl. Klin. Woch.* of Jan. 1900. He divided them in groups corresponding to the stage of the disease. In the first stage of tuberculosis the blood changes are not

typical. In the type of patient in whom tuberculosis is a matter of years of slow development, the tall, pale, thin, rapidly growing young subject, with poorly developed chest, anæmia is present in the first stage of tuberculosis; the erythrocytes are diminished in number, the hæmoglobin reduced, the specific gravity lessened, and coagulation delayed. In the class of individuals having good colour and a liberal panniculus adipose, the blood is normal during the first stage of tuberculosis. In the first group the toxic effect of a long standing but as yet not advanced tuberculosis is apparent. In the second stage of tuberculosis the blood is apparently normal, estimated by the ordinary means for the determination of its character, but autopsies show that the organs of patients dying during the second stage of tuberculosis are very markedly anæmic. The fact is that there is a diminution in the blood mass, a loss of the watery elements, which conceals the true state of affairs by presenting normal findings when the formed elements are counted or the hæmoglobin is tested. In the third stage of tuberculosis the anæmia is no longer concealed under the mask of oligæmia. During this period, hæmoglobin averages 40 to 45 per cent.; erythrocytes, 2 to 2½ millions; specific gravity, 1040 to 1042. The leucocytes are increased, and may number 15,000 to 20,000 at the end of life. In the hyperleucocytosis of the final stage, the polymorpho-nuclear leucocytes are relatively increased, and constitute 85 per cent. of the total number of white blood-cells. Without producing the various evidence which is furnished by different observers on the blood findings, let us analyse these conditions which call for nourishment, and particularly oil nourishment, since in subcutaneous alimentation oil is the only product which to any appreciable extent furnishes force to the body. In the group of cases referred to in the classified examinations of the blood we find that in the first stage, and those who have some fat, that before this adipose tissue is wasted it yields itself to keep up the normal constituents of the blood so far as possible; but in the second stage, and as the disease progresses, there is no adipose tissue to supply the blood, which then diminishes in quantity, and while nature endeavours to force her limited powers into armies of leucocytes with which to destroy the enemy, the disease, she has nothing to feed these defenders upon, the system is completely bankrupt, the adipose tissue has gone, and all nutriment of the body has yielded to the blood in endeavours to supply it with nutrition. The patient is lean, emaciated, and wasted. He cannot digest the food required, and nothing is to be derived from the system. Had subcutaneous injections of oil been instituted early in the disease, the nutriment which the blood requires for destroying the disease would have been furnished.

REASON WHY HORSES, HOGS, SHEEP, AND GOATS ARE SAID TO BE QUITE IMMUNE FROM TUBERCULOSIS.

The reason why horses, hogs, sheep, and goats are quite immune from tuberculosis is on account of their good appetite, keeping them constantly eating, and their good assimilation, converting and storing in their bodies the fat tissues from the most common foods. All that they do is to eat—eat all day when idle, eat all night when worked in the day. It is necessary for them to eat considerable bulk in order to obtain the required nutrition. The appetite of the goat is proverbial, and it is said to be

immune against tuberculosis, so much so, that it is almost impossible to inoculate the germ and obtain symptoms of the disease.

That the assimilation of cattle is much greater as compared to man is noticeable to any one from the remarkable improvement in flesh and healthy appearance when these cattle are fed upon grains containing oils, as linseed and cotton seed, even when most of the oil has been expressed.

FEEDING OF OIL SHOULD CURE TUBERCULOSIS AMONG CATTLE, AND KEEP THEM FREE FROM THE DISEASE.

Since the assimilation of oils produces much more perceptible results in cattle than in man, in that they are quick to grow fat and sleek when fed even upon small quantities of oil, and under these conditions if a cow were afflicted with tuberculosis, I have every reason to believe that, were she not milked, the fats which she would thus give would be stored in her own system, and then given oils in her feed, either linseed, cotton-seed, or sperm oil, that she would recover rapidly, and in a very short time would not react to the tuberculin test, and if so, she would be entirely well; and why not, since it has been variously estimated that from 80 per cent. to every human adult has tuberculosis some time during their life, and that 50 per cent. recover, as shown by pathological post-mortem examinations.

Feed the cows with more oily foods, combine with the feed of milk cows expressed oils of grains, as linseed, or cotton seed, or any other oil, limit the milk-giving period so that they will have a greater vacation in which to recuperate, and you will prevent tuberculosis among them. It must be remembered that there is a great drain upon them, and man should be more reasonable than to demand so much fat in the form of milk upon limited feed.

AGRICULTURE EXPERIMENTAL STATIONS SHOULD APPLY SUBCUTANEOUS INJECTIONS OF OIL IN CATTLE SINCE IT CURES TUBERCULOSIS IN MAN.

In order to gain quick results in the cure of tuberculosis among cattle, we would expect, as with man, better results to follow the subcutaneous injection of oil, since it thus enters the blood probably in the same condition as it passes through the intestine, and is thus more rapidly put into use, and then none of it is lost through non-assimilation. Agriculture experimental stations should apply this form of treatment among tubercular cattle, since it proves a cure in man, and thus shed more light upon a disease which has so long been a scourge to civilisation.

AUSTRALIAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

DUNEDIN, NEW ZEALAND.

ANTHRAX.

MR. J. A. GILRUTH read a paper on "A Method of Rendering Injections of Virulent Cultures of Anthrax Innocuous, and Consequent Production of Immunity." He said that three years ago, when engaged in the study of the bubonic plague, he ascertained that a culture of *B. pestis* of small virulence to the rat and guinea-pig could have its virulence exalted very

NATIONAL VETERINARY ASSOCIATION.

Meeting at Dublin, 1904.

considerably by the addition of a pure culture of a streptococcus, or a diphtheria bacillus. In one case he added to the *B. pestis* of small virulence a culture of streptococcus, and death resulted in four days with the typical post-mortem appearances of bubonic plague. In all cases the *bacillus pestis* alone was found in the spleen and in the tubes above the seat of inoculation. Remarkable as were the results of mixing cultures of plague bacilli and other organisms, they did not lead him to expect the startling results, in an entirely opposite direction, achieved when similar experiments were conducted with virulent anthrax bacilli. As was well known, a guinea-pig or rabbit inoculated with even a small quantity of a pure culture of anthrax bacilli would succumb within from 24 to 48 hours with comparatively no premonitory symptoms, while no evidence of inflammatory action was exhibited at the seat of inoculation. In one case, however, there was intense inflammation around the region of inoculation for the first two days, which nevertheless caused practically no general disturbance and rapidly disappeared. On the fifth day after inoculation the animal was in the best of health, yet on the morning of the sixth day death occurred. Post-mortem examination disclosed a typical anthrax condition, and that it had lost none of its virulence was proved by further tests on rabbits and guinea-pigs after isolation from this guinea-pig. The next experiment was conducted with the object of ascertaining the result of inoculation by fairly equal parts of both bacilli, and for this No. 2 guinea-pig was inoculated subcutaneously by the needle, with 24-hour-old agar cultures of both organisms. No. 3 was inoculated with the accidental bacillus alone, and No. 4 with *B. anthracis* alone, these two guinea-pigs being for control. In 36 hours No. 4 died of anthrax. Nos. 2 and 3 developed faint swellings, with slight redness at the seat of inoculation during the first day, which rapidly disappeared, and both animals remained well until the thirteenth day after inoculation, when each received 0·05 cc. pure broth culture of anthrax bacilli, with the result that both died of typical anthrax in less than 36 hours. In the next experiment equal quantities of broth cultures (24 hours old) of anthrax bacillus and of the accidental bacillus (hereafter called bacillus X) were used, 0·05 cc. of each being mixed with 1 cc. of broth, and the whole injected subcutaneously to rabbit 1. Rabbit 2 was used as a control for the virulence of the anthrax bacillus. The result was that the control died in 36 hours of typical anthrax, whereas rabbit 1 lived till the morning of the fifth day, or three days longer than the control, thus showing that the bacillus X, when mixed in equal quantity with the anthrax bacillus, while not always able to prevent, yet delayed death. Accordingly it was deemed advisable later to inject double the quantity of this organism to that of the anthrax bacillus unless in certain definite instances. The lecturer concluded:—My experiments prove that when this bacillus is mixed with an organism that alone would cause a local congestion or inflammation the latter does not lose this property, and that consequently the protective cells are brought to the spot.

In the resultant fight both the "foreign" organism and the anthrax germ are attacked by the phagocytes; and although the anthrax germ ultimately prevails, it is only after the lapse of a much greater time than occurs under ordinary experimental conditions. In the other cases where practically no swelling or congestion occurs, and where the virulence of the anthrax bacilli is most completely baffled (such as in rabbit No. 13, which on first inoculation received subcutaneously with impunity 0·5 cc. of the

Bacillus anthracis), the circumstances are more difficult, perhaps, of explanation. This is a point that in itself would require to be the subject of extended investigation. As will be seen in the case of rabbit 21, inoculated with streptococci and anthrax bacilli, and rabbit 9, inoculated with bacillus X and anthrax bacillus, both being killed twenty-four hours later, bacteriological examination failed to demonstrate the anthrax bacillus either at the seat of inoculation or elsewhere, though the foreign organisms could be demonstrated. It seems probable that the X bacillus and Guertner's bacillus, possessing no pathogenic power alone, being an easy prey to the phagocytes, and having no harmful effect upon these cells, were rapidly conquered and removed soon after inoculation, and along with them the anthrax bacilli, before they had time to multiply. But these points will repay much more attention than I have had time or opportunity to bestow upon them as yet. Any tentative effort to form a conclusion from theory alone is undoubtedly complicated by the apparently opposite results achieved by mixing a weak plague bacillus with a foreign bacillus, for there it would seem the phagocytes were handicapped by having to fight a mixed infection. The comparative rarity with which animals are affected with anthrax, even when grazing continuously on lands badly infected with anthrax germs, has been the subject of frequent remark. The experiments which I detail in this paper, however, offer a satisfactory reason. No doubt in districts where anthrax is indigenous the bacillus frequently gains entrance to the system; but, as must be the case under most circumstances, being accompanied by numbers of other organisms of a benign nature, no deleterious results ensue unless either the dose of anthrax bacilli be very great or the dose of the foreign bacilli be very small. In conclusion, I must crave your pardon for the incompleteness of these experiments. Naturally, instead of publishing them in their present state, I should have preferred waiting till much more work could be accomplished; but careful consideration of the large field opened up forced the conclusion that the work was not for one, but for many investigators, with greater opportunities than I possess. It is therefore not without a full knowledge of the shortcomings of this paper that I lay it before you, but with a hope that my few observations may be confirmed and greatly extended. —(Applause.)

Mr. J. D. STEWART, M.R.C.V.S., of Sydney, spoke as to the practical application of the information gained by Mr. Gilruth's experiments as a method of protection against anthrax. He considered Mr. Gilruth's results were of great scientific value not only to the Veterinary profession, but to all pathologists. He had great pleasure in seconding the vote of thanks.

The motion, on being put to the meeting by the Chairman (Mr. T. W. Kirk, F.L.S.), was carried with acclamation.

In acknowledging the vote, Mr. GILRUTH said the matter he had brought before them was one for much further investigation. There was work here not for one man alone, but for a number of investigators.

Mr. Gilruth then made the following inoculations as a demonstration: —(1.) Rabbit, as a control. (2.) Rabbit inoculated with a virulent culture of *Bacillus anthracis* and a culture of Guertner's bacillus. (3.) An immunised rabbit with virulent culture of *Bacillus anthracis*. (4.) An immunised rabbit inoculated with virulent culture of *Bacillus anthracis*.

This demonstation will be completed on Wednesday morning at 10.30, when Mr. Gilruth will show the results of these several inoculations.

One of the immune rabbits has received a dose of anthrax sufficient to kill twenty sheep without any deleterious effect upon it.

TABLE SHOWING INOCULATION OF FIRST ANIMALS RENDERED IMMUNE.

Rabbit 10.

Inoculations.	Dose of Anthrax Bacilli.	Dose of Bacilli Enteritidis.	Result.
1. . . .	0.10 cc.	0.20 cc.	Negative.
2. 19 days later,	0.25 „	0.50 „	„
3. 15 „	0.50 „	1.00 „	„
4. 18 „	1.00 „	2.00 „	„
5. 14 „	0.05 „	None,	„
6. 15 „	0.10 „	„	„
7. 14 „	0.25 „	„	„
8. 18 „	0.25 „	„	„

A control inoculated with 0.05 cc. of pure anthrax culture alone at the same time as the first inoculation was made died within thirty-six hours.

The variation in the number of days allowed to elapse between each inoculation was due solely to my frequent absences from headquarters. It was intended to allow about fourteen days to intervene between two inoculations.

Rabbit 12.

Inoculations.	Dose of Anthrax Bacilli.	Dose of Bacilli Enteritidis.	Result.
1. . . .	0.05 cc.	0.20 cc.	Negative.
2. 20 days later,	0.5 „	1.00 „	„
3. 12 „	0.05 „	None,	„
4. 15 „	0.1 „	„	„

(*Otago Daily Times*, January 12, 1904.)

TRANSVAAL VETERINARY MEDICAL ASSOCIATION.

THE Second Annual General Meeting was held at Long's Hotel, Johannesburg, at three P.M., 29th June 1904.

In the absence of the President, Mr. John Peddie, M.R.C.V.S., was unanimously elected to the Chair. The following members were present:—Messrs. B. Runciman, J. Crawford, J. P. Dumphreys, F. H. Dale, S. J. Dale, S. J. Johnstone, F. Lindsay, E. A. Hollingham, E. Kellet, J. H. Bell, J. Gardin, J. K. Pilkington (*Hon. Sec.*) Visitors—F. Eassie (Capt.), A.V.D., Pretoria, Lieut. R. A. Plunkett, Krugersdorp.

After the Secretary had read the Minutes of the last General Meeting, it was proposed by J. H. Bell, seconded by T. H. Dale, and carried unanimously, that they be accepted as read.

Election of new Members.—Proposed by J. H. Bell, seconded by J. R.

XUM

Pilkington, that Captain F. Eassie, A.V.D., and Lieutenant R. A. Plunkett, A.V.D., be accepted members of this Association.—Carried unanimously.

Letters of non-attendance were received from Gaptain R. G. Cochrane, Messrs. F. C. Gafin, J. R. R. Hamilton, F. M. Skues, and J. Chalmers.

The Secretary then read a letter of resignation from J. Irvin Smith, President of the Association, which was fully discussed. Proposed by F. Lindsay, and seconded by J. H. Bell, that the President's resignation be accepted.—Carried unanimously.

The meeting then proceeded to the election of officers for the ensuing year. Proposed by J. H. Bell, seconded by T. H. Dale, that Mr. Stewart Stockman be accepted as President.—Carried. Proposed by E. A. Hollingham, seconded by B. Runciman, that Mr. J. Peddie be Vice-President.—Carried. Proposed by T. H. Dale, seconded by J. K. Pilkington, that Mr. J. H. Bell continue as Treasurer. Mr. Pilkington's resignation as Secretary was not accepted, it being the full unanimous wish of all present that he still retain office as Secretary.—"Accepted."

Proposed by B. Runciman, seconded by J. H. Bell, that the old Council be re-elected.—Carried unanimously. Proposed by J. K. Pilkington, seconded by S. J. Johnston, that Mr. T. H. Dale be elected to fill the place of Mr. J. Peddie on the Council.—Carried.

Discussion on the T.V.M.A. Ordinance then took place, and it was proposed by J. H. Bell, seconded by J. P. Dumphreys, that the Secretary write to Mr. Woollet, P.V.S., Maritzburg, Natal, for a copy of their Ordinance. It was further proposed by B. Runciman, seconded by S. J. Johnston, that the discussion *re* T.V.M.A. Ordinance be left over until the copy of Natal Ordinance be obtained, a copy of which is to be sent to every member previous to the next meeting being held, time and place to be arranged at the next meeting of Council.

Alteration of Rule 16.—Proposed by B. Runciman, seconded by F. C. Gavin, and carried unanimously, to read as follows:—"To facilitate a full and accurate report members who read a paper before the Association shall furnish the Secretary with a copy of the same the day of or following the meeting: such, together with the shorthand report of the discussion and other proceedings, shall be transmitted for scrutiny to two members of the Council, who shall be elected annually, and by them transmitted to the public or professional press, or both, as they deem fit. The Secretary shall issue a copy of such report to each member not more than ten days after the day of the meeting."

Proposed by B. Runciman, seconded by J. P. Dumphreys, "That the two scrutineers be Mr. F. C. Gavin and S. Kellet for the ensuing year."—Carried.

Discussion on Publication of last Pretoria Meeting.—The members present express sympathy with J. K. Pilkington over the criticism on his paper.

Proposed by J. Peddie, seconded by J. H. Bell, "That the Secretary write Captain J. Irvin Smith asking him to reconsider his resignation of membership, at the same time thanking him for the benefit he has conferred on the Association during his year of office as President.—Carried."

Proposed by J. H. Bell, seconded by S. A. Hollingham, "That the Additional Byelaw referred to on page 16 of this book, viz.—'Should include the O.R.C. with the other Colonies, viz.—To admit members of the R.C.V.S. as members of this Association on payment of one guinea (£1 : 1s.) annually.'"—Carried unanimously.

Proposed by J. H. Bell, seeonded by J. P. Dumphreys, "That a letter be written to the P.V.S. of each Colony pointing out this new 'bye-law,' at the same time asking him if he would kindly bring it before the notice of all veterinary surgeons under his command.'"—Carried.

Proposed by J. H. Bell, seconded by B. Runciman, "That officers of the A.V.D. should be accepted as members of this Association on the payment of two guineas (£2 : 2s.) annually, without the payment of an entrance fee.—Carried unanimously.

Proposed by T. H. Dale, seconded by J. Crawford, "That the Ordinary General Meetings be held alternately—viz., Pretoria and Johannesburg."—Carried.

Secretary's Accounts read, audited, and passed. Treasurer's report and account was read, showing a balance in hand up to date, viz. :—

Cash in Bank, ...	£168	5	4
Cash in hand, ...	4	4	0
Total, .	£172	9	4

On the proposal of P. A. Hollingham, seconded by B. Runciman, they were audited and unanimously passed.

Votes of thanks to the officers of this Association for the past year's services were freely gone into, also to Mr. J. Peddie for his occupation of the Chair at this Meeting, terminated the proceedings.

J. R. PILKINGTON,
Hon. Sec.

284 MAIN STREET, JEPPES,
JOHANNESBURG, S.A.

DOUBLE RUPTURE OF THE ŒSOPHAGUS FROM A KICK.

BY M. LEON DUPAS, VETERINARY SURGEON, 31ST REGIMENT OF ARTILLERY, FRENCH ARMY.

THE patient, an eight-year-old mare, was put on the sick list on the morning of December 12th, 1902, from a kick at the lower part of the neck, said to have been just inflicted.

Slightly to the left of the median line of the trachea were two small, smooth patches of irregular outline, but without any excoriation, situated very close to each other. The tissue round them was swollen, about 4 inches in diameter, was soft, painless, and not fluctuating. M. Dupas, thinking that the swelling was only a bruise, did not consider the matter a serious one.

On the 13th December the swelling had greatly increased, and extended all over the lower part of the neck and chest down to the sternum, but was painless on pressure except over the region of the pharynx and behind the trachea, at which point there seemed to be a hollow space under the infiltration, but no fluctuation or crepitation, and it was considered that there was a deep-seated abscess in process of formation. The usual treatment was carried out, and the animal remained in good health.

In the evening the mare suddenly stopped feeding and hung back, respiration became difficult, and performed with a loud roaring that could

be heard some distance off. The patient suddenly ran back in the stall, fell on her left side, and died in a few seconds, a large quantity of blood-stained froth being ejected from the mouth and nostrils.

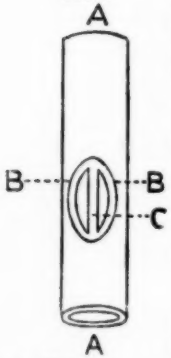
On post-mortem examination the following lesions were noticed :—

1. The subcutaneous connective tissue of the jaw, throat, neck, and chest, for 1 to 1½ inches along the course of the trachea, was infiltrated with a yellow-coloured fluid. On the left side, over the contusion, the tissue was of a grey marbled appearance, running into black, very fœtid, and from which a dirty grey fluid oozed.

2. A perforation with considerable loss of tissue in the left sterno-maxillaris muscle, almost circular in shape, and 2¾ inches in diameter, the edges being jagged and ecchymosed, which was in connection with a pocket in the connective tissue. Some nerve filaments passed across it, also the jugular vein, and it contained some remains of food in a hard mass. This pocket formed a fusiform enlargement about 6 inches long and 3 inches thick, its long axis being horizontal. It was situated on the outer aspect of the œsophagus, from which it separated the sterno-maxillaris muscle. The pneumo-gastric nerve, where it passed over it, was surrounded by a yellow-coloured sheath of gelatinous inflammatory material.

3. There was a double rent in the œsophagus 1½ inches wide by 2 inches long, of an elliptical shape, with a band running down the centre about $\frac{5}{16}$ of an inch wide, dividing the opening into two equal halves. The edges were cleanly cut, slightly retracted, infiltrated, and black.—(Fig. 1.) The upper portion of the œsophagus was filled with food, giving it the appearance of a thick rigid cord.

FIG. 1.



A A. Œsophagus.
B B. Rupture.
C. Band dividing the two openings.

4. Below the œsophagus and trachea was a large patch of ecchymosis over the longus colli muscle, in the left portion of which the fibres were ruptured and a perforation existed, and when the finger was introduced through it, it came in contact with the cervical vertebræ.

5. There was a superficial erosion and patch of ecchymosis on the body of the vertebræ.

Thorax.—The prepectoral ganglia were hypertrophied, black, and infiltrated, the pleura being studded over with black and dark red patches. Both lungs were much congested, the bronchii and trachea filled with froth, and the pericardium with a light yellow-coloured fluid, the visceral fold being studded over with dark-coloured petechial patches that had a tendency to run together. The heart, veins, and large vessels contained dark-coloured blood that only coagulated slowly.

Abdomen.—The stomach contained a certain quantity of food, and several pints of a yellow, bilious-looking fluid. In the left cul-de-sac were a large number of larvæ of the *Œstrus Equi.*

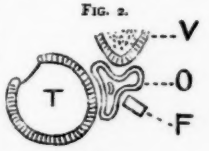
REMARKS.

From subsequent inquiries it appeared that the injury had been inflicted

on December 11th, and not December 12th, as was first said, but, not appearing to be important, the case was not brought to notice till the next day, and then only on account of the swelling that had come up in the night.

The force of the kick was backwards, and from below upwards, and it would appear to have folded up the soft tissues and compressed them between the heel of the shoe and the bone as if between a hammer and anvil, and the double rupture was caused, as can be seen by the diagram. (Fig 2.)

FIG. 2.



T. Trachea.
O. Œsophagus.
V. Vertebra.
F. Heel of the shoe.

POST-MORTEM EXAMINATION OF A DOG SHOWING MARKED DISEASE OF HEART AND LIVER.[1]

BY J. B. WOLSTENHOLME, F.R.V.C.S., MANCHESTER.

MALE collie dog, 15-16 years old. Destroyed June 24, 1904, on account of age, weakness, and chronic diarrhœa. Had not been under treatment or seen professionally. Said to have had attacks of rheumatism. Considerable ascites, no peritonitis, marked anthracosis of lungs, no new growth therein; extensive carcinoma of liver. A cube of coal about ¾-inch in stomach.

Heart (specimen shown). — Hypertrophied, normal shape; weight 8 oz., less 60 grains. Both auricles much enlarged, and bulging, *i.e.*, not collapsed. Left auricle—Ventricular opening stenosed, tricuspid valve much thickened and nodular. The chordæ tendineæ intact and not much affected. The orifice when looked upon from above presented numerous prominences which could not be brought into approximation. The valve was markedly incompetent. The right auriculo-ventricular opening is much larger than the left. The mitral valve is less nodular than the tricuspid, but the edges of this (the mitral) valve are drawn down into the ventricle, by shortening of the chordæ tendineæ. A wide unclosable aperture exists, *i.e.*, marked incompetence.

Liver of Dog.—Same case as the specimen of heart. Sections exhibited. The organ was much enlarged, mottled, and brownish in colour, with a rough slightly lumpy surface. The mottling was grey in colour, and due to the presence of a new growth. This was ulcerating through the capsule in many places, in areas of about ⅛ in. diameter, being especially numerous where the smaller lobes overlap each other. On the broad convex surface of the organ there was an area of about 1 in. diameter of the new growth, with numerous smaller ones. On section the interior was found studded right through with similar areas.

Some of the sections have been stained with hæmatin alone, others with rubin and orange in addition. The growth is seen to be a carcinoma, probably secondary from some other centre. Under the $\frac{1}{12}$ objective, nuclei undergoing various stages in karyokinesis are well marked; whilst in the sections stained with rubin and orange the so-called "cancer organisms," may be made out.

[1] Read at the Quarterly Meeting of the Lancashire Veterinary Medical Society on 1st September 1904.

Empyema of Facial Sinuses in Mare.

Bay cart mare, 11 years old. Reported with a nasal discharge from left nostril with fœtor. It was in the cold winter weather I saw her, and as the general health was good, and no difficulty in working, I recommended waiting until milder weather. She was reported at the beginning of April to be worse, and that she had to stop for breath when drawing a load; she also roared at times. Was brought into hospital, cast, and operated upon on the 12th April. I had the assistance of Mr. G. H. Locke.

The left frontal and superior maxillary sinuses were trephined with a $1\frac{1}{8}$ in. instrument. The frontal sinus was clear, but a very large quantity of inspissated pus of the consistency of rather soft cheese was found on opening the antrum; as you will see by the specimen, the cavity, which is $6\frac{1}{2}$ in. long, was tightly filled from the bulging facial bones, to and through the septum nasi. By means of Volkmann's scoops the greater part of the cheesy pus was removed, and a dependent passage was cleared to the middle meatus.

After the mare had risen from the ground, the passage was flushed with tepid water and creolin, by means of a Reid's pump. The mare resented the operation very much, and for this reason was allowed to rise before all the blocking material had been removed, but as a good passage had been established, it was thought that the daily flushing would soften and bring away all the remainder.

The mare was unusually violent during the subsequent flushings, and developed septic pneumonia, of which she died on the 17th April—that is, five days after operation.

In order to be more precise in describing the conditions let me say that the abscess cavity extended from above, about 1 in. above the inferior rim of the orbit to the level of the intra-orbital foramen below, being $6\frac{1}{2}$ in. in length. All the bony plates, the turbinate bones, and the septum between the superior and inferior maxillary sinuses had disappeared.

You will notice a bulging of the facial bones about 3 × 2 in. involving the part where the nasal and superior maxillary bones join, in front of the lachrymal bone. The passage between the frontal and superior maxillary sinus is reduced to a narrow outlet about $\frac{1}{4}$ in. diameter. The septum nasi is very much hypertrophied, especially in osseous material; at the thickest part it measures $1\frac{3}{8}$ in. Pressure has caused absorption of the nasal septum at a point opposite to where the facial bones are bulging, the size of the opening measures 4 × $2\frac{1}{2}$ in.; the whole cavity is lined by a thick fibrous membrane. You will note that the ethmoid is in close proximity to the diseased area.

Empyema of the Facial Sinuses of the Horse and its Treatment.

The case from which you have the specimen before you suggested to me that possibly a few remarks on the "Treatment of Empyema of the Facial Sinuses in the Horse" might lead to a discussion of some value. The condition is brought about by inflammation of the mucous membrane lining the cavities. Cadiot and Almy speak of it as "Sinusitis."

Causes.—When primary, they are traumatic; when secondary, it is by infection and extension of an inflammation commencing in the nasal passages outside the sinuses, but of the lining membrane common to all.

It is in this secondary manner that the disease is more frequently induced, and the following will indicate some of the causes:—

(*a.*) Infection from a common catarrh;
(*b.*) Infection from the more specific catarrhs, as of strangles, influenza, and glanders.
(*c.*) Those of dental origin, as—1. Caries of the teeth; 2. Periodontal fistula, &c.

The disease is fairly common in horses, is usually unilateral, and in my experience is more frequently a result of one of the catarrhs.

Diagnosis.—A chronic muco-purulent discharge from one nostril; usually more or less fœtid; irregular in quantity, but increased when the head is depressed or the animal is at work, are the common indications, to which sometimes there may be bulging over the affected sinus, and dulness on percussion. I think it is wise to make a careful examination of the teeth and interdental spaces before operating.

Treatment.—When pus exists in one or more of the sinuses treatment other than operative will be of very little avail, for the membrane is infected, and the contents of the cavity can scarcely escape, the opening from the sinus to the meatus being a narrow slit placed at the upper portion. Not only is the exit small, but it may be completely closed by tumefaction of the mucous membrane.

Opening of the Sinuses.—This operation is one of the oldest in equine surgery, and is often the only means by which a cure may be effected. It is simple to perform, and requires no profound anatomical knowledge in selecting the parts and avoiding important structures. Aseptic and antiseptic precautions are unnecessary, and often the use of chloroform is contraindicated. The openings in the facial bones heal rapidly and completely, and very little scar remains. Success depends more, in my opinion, on the regular, careful, gentle flushing of the sinuses after operation than to the operation itself. The operation and after treatment are more suited to the infirmary of the surgeon than to the stable or box of the owner.

Operation.—The parts to be operated on should be clipped and washed. The horse should be cast, with the affected side uppermost.

Especial care should be taken that there is no impediment to inhalation of air by the nostril on the ground. Various shapes of skin-flaps have been recommended. Professor Cadiot uses the V shape, and the late Professor Robertson preferred to remove a circular piece of skin.—(Memo. by Dollar, translating Möller.)

Personally, I prefer a crucial incision, and then dissect back, and cut off the four points until there is plenty of room for the trephine. At the point where the incisions cross I insert an ordinary gimlet, and work it until through the plate of bone. Next the centre bit of the trephine is inserted, and that is worked until the bone is divided, using light pressure when the plate is nearly cut through. I prefer to use a blunt, slightly curved centre-bit (Professor Robertson's pattern, I think), with the concave portion roughened. By this means the disc of bone comes away readily with the trephine after completely cutting it away. The inner and outer edges should next be taken off with a lenticular, and the cavity cleaned and explored.

It is usual in this country to open both the frontal and superior maxillary sinuses. I prefer this method, for, even if the frontal does not

contain pus, it provides an alternative opening for irrigation, and not infrequently the patient objects less to the introduction of water by this orifice than by that just below the eye.

Professor Cadiot recommends opening the frontal and the *inferior* maxillary sinuses, afterwards cutting through the septum which separates the inferior from the superior sinus; by this method all the sinuses may be cleared and irrigated.

The following are Fleming's directions for finding the centre of each sinus, viz.:—

Frontal Sinus.—"This is found on a horizontal line drawn between the middle of the orbital arch on each side, but the opening may be safely made half an inch or so above this line, or as low as a horizontal line between the inner angle of each eye. . . . The opening should be in the space between the frontal suture and the eye."

Superior Maxillary Sinus.—"The best place for opening it is at an equal distance between the internal angle of the eye and the zygomatic ridge, behind the nasalis longus muscle" (*i.e.*, The levator labii superioris proprius of M'Fadyean.)

The Inferior Maxillary Sinus "should be opened about half an inch above the zygomatic ridge, about an inch before its termination. Lower than this point the branches of the glosso-facial artery and vein are exposed to injury."

If the disease is of dental origin, and this has been noted before casting, a tooth may be drawn previously, but if discovered after trephining, the tooth should be drawn or punched out whilst the horse is on the ground.

The after-treatment consists in copious flushing of the sinuses with weakly medicated tepid water once or twice daily. This should be done with the animal in the *erect* position. I prefer to use a Reid's pump with a long tube, to the end of which a piece of bent metal tubing is fixed, the free extremity being armed with two or three inches of indiarubber drainage tubing. A tampon of boracic gauze should be inserted into the operation holes, and if a tooth has been extracted the aperture should be carefully filled with the same material. The fangs of the fifth and sixth molars reach to the superior, and those of the third and fourth to the inferior sinus. In the majority of cases thus treated a cure will result in about a month. In some there will be improvement, but not a radical cure; as in a case within the last year which I trephined on two occasions, and all three were sinuses opened. Now and then, by the passage of some of the morbid material to the lungs, septic pneumonia will supervene, as in the case of the specimen before you. This is a contingency that must be risked, and I can see no means by which it may be obviated. It is, however, infrequent, the present one being only the second I have had. It should be remembered that the facial sinuses do not attain full size until adult life.

Literature.—The work on Veterinary Surgery by Professors Cadiot and Almy, of Alfort, is by far the best I have seen, and the directions given are excellent. Möller's Veterinary Surgery, as translated by Dollar, is also very good on the subject. There is a fair account of the disease and operation in Zuill's translation of Friedberger and Fröhner's work on Veterinary Therapeutics; but I do not agree with the translator's note that "opening the lower portion of the inferior maxillary sinus, which ensures the most perfect drainage. This one opening is sufficient *for all purposes of treatment*, which in all uncomplicated cases will result in cure."

XUM

STIFLE JOINT LAMENESS—DEANS' OPERATION.

BY E. FAULKNER, M.R.C.V.S., KNOTT MILL, MANCHESTER.

SOME twelve months ago I was consulted by the owner of a valuable shire gelding, then five years old, 17·2 hands high, which had during the previous year been a frequent winner at various shows, and was expected to have a great future.

Unfortunately, about Christmas 1903, when undergoing preparation for the approaching show season, he suddenly became lame on the near stifle joint (from an injury sustained in his loose box, it was conjectured), the result of which still existed after six months' rest and treatment,—when I was requested to visit, examine, and advise as to his recovery or otherwise.

On the day of my examination he was out at grass, low in condition, standing with the limb bent or semi-fixed, swelling in front of joint hard and prominent, the capsular ligament distended with synovia, moving lame in the trot, and inclined to go over on to the front part of the foot when walked.

The desire being strong to fit him for showing purposes again if possible, it was decided to take some risk to that end. Consequently I advised that Mr. Deans, M.R.C.V.S., Bishop-Auckland, be asked to operate upon him, and in August 1903 he attended. We cast the animal, and on inserting the aspirating needle of his syringe into the capsular distention found the synovia so organised as to be unable to withdraw any fluid. Notwithstanding this, the special preparation he uses was injected, and afterwards the animal allowed up.

For two months subsequently he stood in a loose box, and had daily exercise, afterwards being placed at farm work, until early this year, when he was put into show condition, has been exhibited repeatedly, is heavy in flesh, invariably first in his class, and champion, goes sound, does not ease the limb or show joint enlargement,—in fact, can be said to have made a complete recovery.

Mr. Deans informs me that recovery is quicker when the synovial fluid can be removed by the syringe.

SPINAL MENINGITIS FROM AN INJURY.

BY LIEUT. E. P. ARGYLE, ARMY VETERINARY DEPARTMENT, ALDERSHOT.

Subject.—A bay gelding, 14·2, in charge of the Mounted Infantry.

It was admitted to the sick lines on 9th June 1904 suffering from a severe contusion, with swelling, on the off side of the neck, about 6 inches from the occipital crest. The injury was attributed to his violent struggling whilst tied up to be shod, as he had struggled in the same manner on several previous occasions.

There was no elevation of temperature, and at first his appetite was good.

The swelling, however, increased, his neck became very stiff, and he could hardly bear it to be touched. Constant fomentations were applied, and I made several attempts to reach the abscess cavity, but without avail.

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XUM

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There was no elevation of temperature, and at first his appetite was good.

The swelling, however, increased, his neck became very stiff, and he could hardly bear it to be touched. Constant fomentations were applied, and I made several attempts to reach the abscess cavity, but without avail.

On the 20th June his appetite began to fail, and after that his head

drooped lower and lower every day. He took no notice of any one who approached.

On the 27th June he refused all food and only drank a very small amount of water.

On the 28th he continued in the same condition, but towards evening he revived somewhat and took a little hay.

On the 29th, after drinking some water containing a little stimulant, he suddenly fell dead.

Post mortem.—On cutting into the swelling nothing was discovered immediately under the skin beyond discoloration. On cutting deeper however, pus began to exude beneath the posterior oblique muscle of the head. On dividing this muscle I found that there was a space between it and the rectus capitis posticus filled with thick yellow pus.

On following this cavity inwards it extended to the vertebrae, and on dividing the vertebral column I found pus in the spinal canal.

In a downward direction the pus had penetrated behind the parotid gland, and also into the guttural pouches.

Owing to the deep-seated situation of the abscess it was practically impossible for an operation to be successful.

The ligamentum nuchæ was also implicated.

SCLEROSTOMUM ARMATUM AND *TETRACANTHUM* IN RELATION TO SOME DIGESTIVE DISORDERS OF THE HORSE.

BY T. C. GRAVES.

(*Continued from page* 158.)

EFFECT ON INTESTINES WHEN PARASITES AFFECT ANTERIOR MESENTERIC ARTERY OR ITS BRANCHES, PRODUCING ANEURISMS.

The presence of an aneurism with its accompanying thrombus reduces the calibre of the great mesenteric artery, and therefore diminishes the supply of blood to the intestine. This effect, of course, depends on size of thrombus and the effectiveness of anastomoses of the intestinal arteries. But it nevertheless has some effect on the nutrition of the intestine, and as a consequence the glands and muscles do not receive their proper nourishment, and hence digestive troubles arise, thus constituting a serious predisposing cause to colic, if not colic itself.

Again, the clot formed in the interior of the aneurism as it undergoes softening is liable to disintegrate, and so fragments carried from it by the blood constitute so many emboli in the intestinal vessels.

Depending on the size of the embolus, the obliterated artery is more of less voluminous, and disturbance set up more or less serious. There is sudden anæmia of that portion of the intestine to which the artery is distributed, and consequently paralysis of one or more sections of the digestive tube, and the secretions and movements of that part are suspended.

That portion of the intestines becomes at first pale, then of a dark red colour, from venous congestion; mucous membrane becomes swollen;

there are hæmorrhagic infarcts; serous exudates, ecchymoses, and increase of the part in volume, constituting embolic enteritis.

In addition to this, bacteria from the intestinal tube invade the hæmorrhagic parts, and gangrene follows the necrosis, so that part of the intestinal wall may slough.

Mr. Willis, of the L.G.V.C., records a case of sloughing of the wall of the cæcum to the size of a five shilling piece as a result of embolism or cæcal arteries. In this case there was an immense parasitic aneurism on cæcal artery about seven inches away from the point of its divergence from the anterior mesenteric trunk.

A somewhat similar case is described by Mr. Blanchard in *Veterinarian* of 1895.

As a result of anæmia and paralysis of that part of the bowel whose vessels are plugged one may also get—

Tympanites.—Due to putrefactive changes and abundant production of gas. This is result of inability of bowel to hurry the alimentary matter along, and consequently by stagnating it ferments. Production of gas may be so great as to result in rupture of the already weak wall.

Volvulus may occur as result of loss of muscular power on the part of the anæmic intestine.

Invagination or Intussusception.—In the horse the most common intussusception is that of the last few feet of the ileum into the cæcum through the ileo-cæcal valve, or it may be the cæcum may be invaginated on itself. This occurs as loss of muscular power in cæcum as result of blood supply being interfered with.

Emboli may be carried to the kidneys or iliac or spermatic arteries, and produce diseased conditions. Spermatic arteries often contain the parasite itself. "Agricola," in June *Veterinarian* of 1893 describes a case of parasitic ascites due to selerostomes beneath the parietal peritoneum. Numerous large strongyles were located between it and the muscles, the membrane being perforated with very small openings, some of which were surrounded by slight blood-stains. "This case," he says, "was only one of many occurring on the same farm, which was a cold clay one, and the only water supply to the pasture was a pond."

Finally, when large numbers of these worms are living in the circulatory system of a horse, besides robbing their host, their excretions must have some detrimental effect on the animal's health irrespective of the other conditions which may result from their presence.

STATISTICS BEARING ON THE SUBJECT.

Hering has asserted that except in young foals it is rare to find a horse with aneurismal dilatation. Bollinger estimated at 90-94 per cent. the proportion of adult horses so affected. In 35 horses Bollinger counted 60 aneurisms. In 65 horses Hering found 108 aneurisms. In *Veterinarian* of 1857 Mather reports "cases of strongyles within arteries of yearling colts," which seems to indicate that he saw what might be described as an outbreak consisting of verminous aneurisms of the aorta near the origin of the renal arteries.

Mr. Willis of the L.G.V.C. states "that as the result of a lot of post-mortem experience a perfectly sound anterior mesenteric artery is unusual," and that he "rarely makes a post-mortem without finding evidences of

parasitic invasion." Especially is this marked in those animals that die of colic diseases, where 99 per cent. die with aneurisms.

He further states that "in all big concerns a change of diet produces immense numbers of cases of colic; but apart from these gluts there are single cases cropping up at odd times without any regard for change of food or feeding or watering. It is amongst these, I fancy, that the strongyle is operating."

He believes that more careful post-mortem examinations would reveal a greater proportion of fatalities due to parasitic invasion.

CATARRHAL ENTERITIS CAUSED BY *S. ARMATUM* AND *S. TETRACANTHUM.*

Cause.—Presence of embryonic and adult worms, acting as an irritant to the mucous membrane.

Pathological Conditions.—Swollen, jelly-like appearance of the mucous membrane, especially the epithelium; this is dotted over with small black spots as if black pepper had been sifted over it. These spots are the tumours caused by the embryos.

Seat.—Most commonly cæcum and large colon.

History.—Animal has been out to pasture for some few months, and has not done very well; probably noticed to get thinner. Then later it scours, and professional advice is sought.

Symptoms.—Animal emaciated and tucked up at the flank; hangs its head, and has a haggard look and harsh unthrifty appearance; coat staring; eye sunken.

Visible mucous membranes vary in different cases. Sometimes anæmic, at other times slightly conjested, and occasionally tinged yellow. Anæmic membrane is indicative of large amount of blood lost by animal through these parasites.

Pulse irregular, and may be very weak; temperature generally normal; respirations increased; appetite often wanting, sometimes capricious; breath fœtid. Diarrhœa, which is often fœtid, is present, and contains numerous parasites generally. *Scler. tetracanthus* recognised as small red-worms.

There is sometimes an intermittent dull pain; periods of ease succeeding passage of fluid motions. Often, however, there is no pain evinced.

When pain is present it is shown by animal lying out at full length with legs extended, occasionally raising the head to look at the flanks, or whilst standing looking at the flanks. At other times stretching out as though wishing to urinate. At intervals, when pain is intermittent, animal appears brighter, and may eat a little. Extremities are cold.

Dropsy is said to take place into the depening parts.

Diagnosis.—Presence of worms in very fluid discharges are principal guides.

Treatment.—Where diarrhœa is caused by parasites the object is to get rid of this cause, but whilst attending to this object one should be careful to select agents which while effecting that object do not make worse the already irritable condition of the mucous membrane.

Probably the best agents to destroy these parasites is oil of turpentine. This may be given in one or two ounce doses according to age of patient, and it may be given in either milk or half a pint to a pint of linseed oil, according to the condition of the fæces.

If the evacuations are semi-solid, then one may give the turpentine in linseed oil.

If very liquid, best to give it in milk, and trust to the already fluid discharges to get rid of the dead worms.

After this one may give a mixture of chlorodyne, half an ounce, and liq. ferri perchlor. ʒi. daily, chlorodyne having an antispasmodic action and the iron a tonic astringent and styptic effect.

Others advise a ball made of—

Ferri Sulphat. ʒii.	Aloes Barbad. ʒii.
Antim. tart. ʒi.	Venice turpent. a sufficiency daily.

Oil of peppermint in one-drachm doses as an antispasmodic and antiseptic may be exhibited.

Opium in ʒi.-ʒii. doses may be used, diminishing secretion and movement.

It is not advisable to use this drug until one is sure that the cause has been got rid of.

Similar drugs in action to lead acetate, catechu, tannic acid, hæmatoxylin, kino, copper sulphate and silver nitrate may be used.

Agents which mechanically coat the bowel may be tried, as chalk, bismuth subnitrate, and charcoal.

Some use a mixture of turpentine and creasote in large doses. This is irritating, though antiseptic.

Later on treatment consists in giving drugs such as sulphate of iron, liq. arsenicalis, antimony tartrate, quinine sulphate, nux vomica, and the bitter and aromatic vegetable tonics, such as gentian and aniseed.

Santonin as a parasiticide may be used, but for the horse it is expensive, and turpentine is probably as good. Rectal injections may be useful in aiding expulsions, such as solution of salt, quassia, or tobacco decoctions.

Feeding.—Probably in first few days of treatment animal may not eat much, and therefore, considering the state of the bowels, the food should be small and easily digested. Milk and eggs are very useful food.

Theoretically an albuminous diet is indicated in diarrhœa because of loss from the blood and tissues, and because intestinal digestion is disordered starchy food would be undigested and cause fermentation. Practically a certain amount of starchy food seems to be serviceable in treatment of diarrhœa. Some recommend cooked flour or barley gruel and cracked oats, others condemn gruel in any shape or form. Coarse food, as chaff and green fodder, are not allowable in early stages.

Restorative diet includes good oats, bran, linseed cake, hay, and grass, with occasional milk and eggs.

As extremities are cold, bandages and rugs should be applied. Although one may have got rid of all the parasites from the intestine, it by no means follows that the animal no longer harbours any sclerostomes. Cases have been met with where an animal has apparently recovered from catarrhal enteritis, but sometimes later it has died from embolic enteritis. In these cases the larval forms in the arteries have not been got rid of.

So that after an animal has apparently recovered from catarrhal enteritis one would be perfectly justified in giving tonic medicine or a dose of turpentine occasionally.

Embolic Enteritis.

Cause.—Thrombi in arteries supplying intestines, principally anterior mesenteric and its branches.

The thrombus undergoes softening, and parts of it are carried by the blood stream, and eventually plug the arteries supplying the intestines.

Effect of plugging is to cause a venous congestion as a result of loss of blood pressure in vessels in front of the embolus. The effect of this plugging may be minimised by the anastomoses of the vessels supplying the intestines, but before the blood from the anastomosing artery has raised the pressure sufficiently serious changes may have occurred. Theoretically, embolic enteritis should never take place, as the wonderful arrangement of anastomoses ought to prevent its occurrence.

But nevertheless it does occur, and one is forced to admit that the action of the anastomosing arteries is not so perfect as it is supposed to be when it is called on to make an extra effort. An example of this may be mentioned. The right and left colic arteries anastomose at the pelvic flexure of the double colon, and one can see that by this arrangement the effect of one embolus in one of them could be counterbalanced by the action of the other artery.

But cases have occurred in which both colic arteries were plugged up by emboli from a thrombus in the large mesenteric trunk.

But, on the other hand, the anastomosing action is often efficient, and many attacks which might otherwise end fatally have a satisfactory termination after showing symptoms of abdominal pain.

History.—Generally the animal has been out to pasture, and after being brought up or whilst still at grass may not do as well as the owner expects it.

Still it may not have shown any other symptom of ill-health. Feeding well, but does not seem to do well on the food. Then it is noticed off its feed later, or has an attack of colic, or may scour, and then that passes off.

Finally professional advice is sought.

Symptoms.—Animal in poor condition, as evidenced by harsh, staring coat. Is dull and listless when not interfered with, and may stand in one position with head depressed for hours.

Sometimes, on being made to move, it shows a staggering, uncertain gait, apparently due to loss of co-ordination of muscles of limbs. Occasionally muscles of face, when animal attempts to eat anything, seem to have lost their control, and this may even extend to muscles of throat, causing animal to make a noise in respiration.

On being excited, and made to move round the box—some animals in this condition—may suddenly rear up and then fall down backwards apparently exhausted.

At other times the nervous symptoms shown are those of colic. Animal walks round box seemingly in great pain, or stands still and draws up his hind legs, looks towards the flanks, or may roll over and kick about.

Pain may then subside, and animal becomes dull and listless.

Visible mucous membranes are sometimes congested, at other times very pale; occasionally show a rusty tinge. Extremities vary. In dull variety generally cold.

Internal temperature generally above normal. May vary from 102° to 103°; sometimes later up to 105° or 106°.

Respiration.—If animal is dull, respiration not much increased. If colic is present there is increased breathing.

Pulse.—Varies according to pain exhibited. If animal is dull, pulse generally weak—sometimes imperceptible. If pain is manifested, beats increased in number; vessel is full; later may become thin and thready.

Breath often fœtid.

Appetite may vary. Generally animal does not eat food; but often when there is shown loss of proper control of limbs animal has a depraved appetite, gnawing manger and chewing the litter.

Occasionally tympany is observed. More often animal is tucked up at the flank.

Evacuations, generally normal in consistence, but covered with mucus later; fæces may be less solid.

When diarrhœa is shown it is usually indicative of catarrhal enteritis associated with embolic.

Rectal exploration may reveal parasites; generally it does not.

With reference to loss of control of hind limbs, this might be due, one would suppose, to an embolus from mesenteric or aortic thrombus plugging up the iliac arteries, but post-mortem examination has revealed nothing of the sort. Further, the aneurism, when one examines it, is often found on the mesenteric artery or its branches, and no part of the thrombus projects into the lumen of the aorta.

Again, examination of the brain has revealed no abnormality. This loss of control, I venture to think, is due to general weakness.

Diagnosis.—Difficult to come to a conclusion on seeing animal for first time.

Take into consideration history of case.

Animal has at one time, generally not very long before, been out to grass on cold, heavy land, badly drained, and although well fed, has not done well. Animal at one time may have been noticed to pass worms.

One may have attended the same animal some time before for catarrhal enteritis.

If loss of control symptoms are well marked one would be then justified in suspecting a verminous aneurism has thrown off emboli and produced embolic enteritis.

Treatment.—If one has diagnosed the case the best agents to use are those which dilate the vessels of the abdomen, and by so doing may hasten the anastomosing action.

Such drugs as the nitrites: spiritus etheris nitrosi, spiritus ammon. aromatic, ammoniæ carbonate, and other vascular stimulants.

Where one has to treat the symptoms one gives stimulants, and here one will not be far out from the treatment adopted when one suspects the cause.

Tonics, such as iron and quinine, if anæmia, is well marked. If animal can be got to eat, good wholesome food should be supplied.

In colic variety, sedatives, as morphine hypodermically, or morphine and atropine, chlorodyne, chloral, cannabis indica.

In these cases where abdominal pain is well marked animals often in good condition, whilst in dull variety often emaciated.

Cause of Death.—May be due to rupture or sloughing of intestinal wall. Intoxication by absorption of septic products derived from necrosed intestine.

Stoppage of heart, induced by violence of intestinal pain.

Emaciation and general weakness due to loss of blood and food elements.

Tympanitis and its effects.

Prevention.—In a large proportion of these cases of parsitism, history will indicate that the animals have been grazed on heavy clay or badly drained land.

As a result of feeding, large numbers of horses on same land year after year the farmer may experience great losses.

The conditions also exist in the Fens, where the land at certain seasons is very marshy, if not completely inundated. From this one would gather that the parasite requires, while outside the body, a moist medium for its development.

Probably the best place for this development is the stagnant water of a pond.

Some think that the grass may have something to do with it—that animals are affected through green forage. Possibly it is the earth which is taken in along with the grass that is the means of infection.

The common village pond may be a means of spreading the disease to all and sundry.

Finally, in connection one must take into consideration the affected animal.

If one's advice is asked as to the best way of preventing any further occurrence of parasitism, the following points may be suggested:—

(1.) Abolition of ponds and other stagnant pools of water used for drinking purposes, replacing them by troughs, the water for which is drawn from deep wells, &c., which cannot become affected with the droppings of the animals.

A more elaborate idea is filtration of all the water which the animals drink.

(2.) Have land drained, or, if several cases have occurred in animals which have been grazed on some tract of land, it would be cheaper in the long run to plough it up, and during its cultivation as arable land plough plenty of long straw manure into it.

Some advise use of gas lime, 2·5 cwts. per acre.

(3.) If animal has been noticed to pass a few worms, and is otherwise healthy, or no serious symptoms have developed. In such a case give two ounces of oil of turpentine in milk or linseed oil, followed up by tonic powders or balls containing iron sulphate, antimony tartrate, &c.

(4.) In case of an animal obviously ill, that is, passing large numbers of parasites, it is advisable to see that the infested evacuations do not find their way to the manure heap.

ENCEPHALITIS.

BY CAPTAIN P. J. HARRIS, ARMY VETERINARY DEPARTMENT, ALDERSHOT.

THE patient was found about 4.30 A.M., on the 18th August, lying on his back in an empty stall with his hind legs over the bale. He had got loose and wandered into this empty stall, where he was found. When I was called to see the animal he had been released and was lying in the middle of the stable. On examination I found him to be in a comatose condition,

pupils dilated, mucous membranes highly injected, extremities stone cold, and complete insensibility to external impressions, respirations feeble and pulse weak. There were numerous wounds about the hind legs and the underlip was badly lacerated. I ordered hot blankets to be applied along the spine and the legs well rubbed to restore circulation, catheter passed, and fæces removed from rectum. Patient remained in this condition for some time, after which he made efforts to get up and every endeavour was then made to raise him but without avail. In the meantime I had sent for a horse float to convey him to the sick lines, so now gave orders to let him lie quietly. The float having arrived he was with difficulty conveyed to the sick lines and placed in a loose box. I then endeavoured to have him slung, but, making no effort to stand, I had him released. Cold water swabs were applied to the head and the body well rugged. Linseed gruel and green grass were placed in front of him, but he made no attempt to eat or drink. About 5 o'clock P.M. he suddenly got up, only to fall down again in a few seconds. This he continually kept doing and became violent, dashing himself against the walls of the box. During the relapses I injected sedatives subcutaneously, but by 7 o'clock P.M. he was in a pitiable condition, having literally cut himself to pieces, so I decided to put him out of his misery and had him destroyed.

Post-mortem.—The substance of the brain was very red and highly congested. Extensive bruising of the muscles behind the head (poll), alongside spine, and over the quarters. Macroscopically the other organs were in a healthy condition.

Remarks.—By the extensive bruising and the evidence of the man who found the animal he must have fallen backwards, endeavouring to free himself from the bale, causing concussion of the brain, and when he became violent, inflammation had set in.

Translations and Extracts.

TORSION OF THE GRAVID UTERUS.

BY C. HAASE (HŒNMOLSEN).

THE author's paper is most interesting, especially from a clinical view, as it is the result of long experience in a breeding district where torsion of the uterus is very frequent.

He confines himself to discussing treatment by rotation, especially how this manœuvre is to be performed. Like most writers on the subject, Haase recommends that the cow should be rolled in the direction of the folds that exist in the walls at the fundus of the vagina and neck of the uterus. He then goes on to point out that this is often most distressing to both the operator and patient, and not always successful, causing shock, which renders immediate slaughter necessary if the animal does not die from hæmorrhage. He maintains that this can be avoided if the cow is rolled on a slope instead of a level surface, as recommended in most text-books.

In order to explain the mechanism of torsion of the uterus and the changes that take place in the position of both it and its appendages

the author compares it to a pendulum, the weight being represented by the fœtus suspended by the two large ligaments as well as the body and neck of the uterus where joined to the vagina, the fixed point being the vagina and attachments of the broad ligaments..—(FIG. 1.) Under these conditions the weight of the fœtus and envelopes, as can be easily understood, plays a considerable part in giving rise to torsion in the first place as well as aggravating it, and that the first step in reduction of the twisted organ is to neutralise this weight.

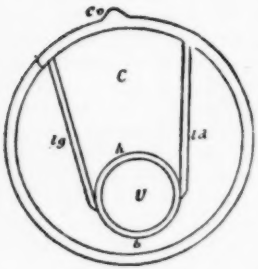

FIG. 1.

C. Abdominal cavity.
C v. Vertebra.
U. Uterus.
l g. Left ligament.
l d. Right ligament.

There is no doubt that Lempen and other authors had this object in view when they recommended that the mother should be thrown on a good bed, that the hind quarters should be raised and the fœtus fixed by the hand introduced into the passage. Haase fully approves of this, and gives some diagrams that explain the theory.

He begins by remarking that the term "fixing the fœtus" is incorrect, and that "stable" would be more appropriate, as the body of the mother rotates round its long axis and the fœtus partakes in the movement to the extent of one or two revolutions. The stability of the fœtus is a powerful factor in inducing relaxation, which is a *sine qua non*, for if the ligaments continue in a state of rigidity they strangulate the uterus, and as long as they remain so the movements of the mother's body are communicated in precisely the same degree to it, so that the twist becomes greater.

The diagram No. 2 shows the effect of the pressure of the ground on the uterus when the cow is on her side on a flat surface, the fœtus not being sufficiently stable to allow the broad ligaments to relax. In such a condition rolling the mother will only make matters worse, as the fœtus follows the maternal movement.

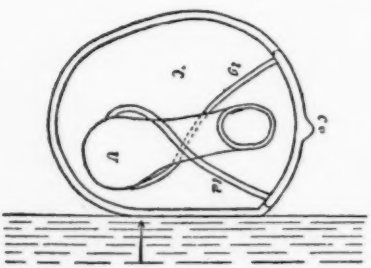

FIG. 2.

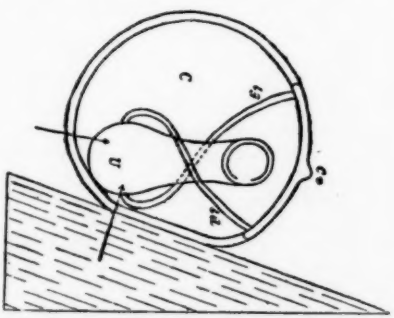

FIG 3.

If the surface is sloping it is different, for, although the pressure acts in the same direction as on flat ground, the weight of the fœtus counteracts it, as is shown by the arrows in No. 3. The two forces displace the

uterus in the direction of the spine, and it acquires a sufficient amount of stability to allow of the ligaments becoming completely relaxed, and the steeper the surface is the more this movement is facilitated.

If, for instance, there is a torsion to the right the cow is thrown on that side with her feet towards the top and spine to the bottom of the slope, and then given one turn round, so that this position is reversed, when the parts should be again examined, and if the folds have disappeared parturition will take place without further trouble, but the effort should be left to nature to perform, for, as Bruin has pointed out, the parts have been strangulated, and time must be given for them to be restored to their normal condition. This authority gives a word of warning against officious interference.

Should, however, the movement not prove successful, it is to be repeated, care being taken always to replace the animal in the first position on the top of the slope.

Haase speaks strongly against giving the body a complete turn, as it only replaces the gravid uterus into the position of the pendulum, increases the rigidity of the broad ligaments, and ends in complete strangulation, and to this reason he attributes most of the failures that have been from time to time reported.

If these means fail then slaughter is advised, as it is certain that the obstruction is from some other cause than torsion. Some authors recommend recourse to laparotomy, about which Haase speaks with reserve, as he has had no experience with it.

The method described relates to complete torsion, but if it is partial, that is to say, from a quarter to a third, so that the hand can obtain access to the os and the fœtus, parturition can be accomplished without throwing the patient. The accessible parts, that is, the head and fore limbs, or the hind, according to the presentation, should be brought into the vagina as far as possible, so as to bring the remaining parts of the body as far backwards and upwards as possible, thereby bringing the strain off the broad ligaments. In most cases the uterus on being relieved of the strain will adjust itself by contraction of its muscular fibres, and the calf will be rapidly born; if not, rotation should be tried.

To sum up, in such cases the following indications should be followed:—

1. Careful examination of the patient to determine the exact degree of torsion.
2. In partial torsion, when the fœtus can be felt, attempt to deliver the animal standing as described.
3. If there is complete torsion use rotation on an inclined plane in the same direction as the folds of the uterus.

Berliner Thierärztliche Wochenschrift, 1904.

EDITORIAL NOTE.

By some mischance in the Printing Office figures 2 *and* 3 *were "mixed" into an article on "A New Apparatus for Securing Horses," which appeared in last month's issue, and we here give a loose sheet as it should have appeared in that article.*

THE ETIOLOGY OF OSSEOUS CACHEXIA IN THE PIG.

BY M. MOUSSU.

THE disease that I have termed osseous cachexia, but which is also known as osteomalacia, osteoclastia, osteoporosis, &c., exists in all the domestic animals; but in this paper I propose to confine my observations to the pig.

The disease in this animal is popularly known as snuffles, bone disease, foot disease, and gout. It attacks animals from three months to a year old, and the symptoms are loss of appetite, lameness in one or more of the limbs, difficulty or impossibility in moving, and snuffling or choking, that is to say, difficulty in breathing. When attacked the animal lies down and can only rise up with difficulty. If made to move he frequently does so on his knees, and lies down again as soon as possible. The snuffling, which sometimes comes on prematurely when the animal can move without difficulty, is always accompanied with deformity of the face from characteristic tumefaction of the superior maxillary, nasal, and palatine bones, but in other cases the snuffling does not come on till movement is impossible.

In some cases the pigs can be fattened, but in the majority they refuse to feed, become thin and emaciated, and die, and in practice it is useless keeping them alive.

In many cases the bones of the head and face become so tumefied as to completely obstruct the nasal cavities, and respiration has to be carried on through the mouth. The lower jaw is dropped, and the tongue kept hanging out, the palatine arch bulging into the mouth, so that mastication is impossible, and the animal dies from starvation. If the pig is made to walk or even move he is suffocated, and dies from asphyxia.

Some practitioners consider these symptoms point to the disease being rachitis pure and simple, but this I disagree with, and prefer to term it osseous cachexia. It is to my mind impossible to reconcile the alteration in the bones to those seen in rachitis, but, on the contrary, they exactly correspond to those of osseous cachexia.

The disease is widely spread, but is particularly prevalent in the pig-breeding districts of Sarthe, Mayenne, Berry, Sologne, Aube, Marne, and Haute Marne, in certain years, causing great loss. In 1901 three-quarters of the young pigs in certain parishes of the Department of l' Asne were carried off.

On post-mortem examination of animals that had died and been killed, the lungs, heart, liver, spleen, kidneys, and digestive organs appeared intact, except from the fact that no food had been taken, the lesions appearing to be entirely located in the skeleton and locomotor apparatus. They consisted of tumefaction of the articulations, deformity, and incurvation of the long bones and hypertrophy of the flat; but in some cases there was deformity of the bones of the head, without any of the other parts of the skeleton. The bones of the face appeared to undergo a species of fibrous change, the calcareous portion being absorbed, greatly hypertrophied, and the primary elements so altered that the histological texture could with difficulty be made out.

There was synovitis and arthritis, the synovial membrane being only slightly inflamed, the joints at first being filled with a clear synovia that became clouded later on, and in acute cases tinged with blood.

The articular cartilage was eroded, roughened, and the surfaces

irregular, the extremities of the bones being flattened and deformed. On section of a long bone the marrow was inflamed, red, and hemorrhagic in places even in animals in good condition. These conditions easily accounted for the difficulty there was in mastication or moving.

I have on former occasions stated that up till lately I have looked upon errors in feeding as the cause of osseous cachexia, it alone appearing to be founded on a scientific basis, also because all my observations have been made on the horse and ox, although some later ones on the pig have given rise to doubts in my mind.

No doubt the disease is usually seen in poor localities where animals are badly fed and cared for, but nevertheless I have seen it in well regulated piggeries.

When the food only consists of kitchen and dairy refuse with potatoes it is difficult to say if the chemical constituents of the food are correctly balanced for the proper growth of the skeleton; but when pigs are affected that are getting good food, such as whole milk, cooked grain (rye, maize, buckwheat, oats), and haricots and beans, with good potatoes, it seems impossible to blame the food.

I have more than once thought it might be of an infectious nature, and it is with regard to this fact that I invite attention.

I. In June 1900 I had under my care a young pig suffering from well-marked osseous cachexia. In July I placed with him in the same stye a healthy one that I obtained from a piggery where the disease was unknown. Both got the same food which was fed to the other pigs on the same farm, where the disease was unknown. The diseased pig died in the beginning of August, and in September the control animal began to show symptoms of disease, dying from it in an acute form on October 28th.

II. The stye in which these two pigs had been kept was not disinfected, only the soiled litter removed, and a healthy pig two and a half months old placed in it. About the 15th December he began to show symptoms of the disease, which were well established in the beginning of January 1902. This experiment is particularly interesting, as it shows that actual cohabitation is not necessary to reproduce the disease, simply living in a contaminated place for a sufficiently long time being enough if the place has not been properly disinfected, and explains those cases that so often appear in rural districts where owners say that it is impossible to rear pigs because they all contract "foot disease," and where several animals that come from different known healthy places all become affected one after the other.

It is probable that the infective agent is contained in the excreta, and develops in the litter, infecting any fresh animal. I use the term probable because up to the present I have been unable to reproduce the disease experimentally by any of the cultures I have made.

These two experiments having pointed out the infectious nature of the disease, I have endeavoured to discover how it can be directly transmitted and by what tissue.

The condition of the cancellated structure of the bones, the epiphysis, and marrow point to evident localisation, and it is only reasonable to suppose that they and possibly the synovia are the virulent tissues.

III. In February 1902 I obtained a case of the disease from the Department of Indre, which was destroyed, and guinea-pigs, rabbits, young pigs, and goats inoculated with an emulsion of the marrow from the long

bones. There was no result with the guinea-pigs or rabbits; the two pigs, however, became affected in less than a month. An adult goat, which was inoculated on 19th March, began to show symptoms on 10th April, dying on 5th July.

The two pigs developed the disease in a subacute form; they were well fed, and improved to a considerable extent, but never completely recovered the use of their limbs. I have noticed this fact, that in an outbreak all those attacked do not die at once; some will live for months, but never completely recover; it is, however, useless keeping them alive. Also that the disease appears to be communicable from one to another only at its commencement or while in progress when stationary, or during convalescence, it appears to have lost its virulency.

IV. In May 1902 I obtained an animal from the Department of Marne that had been ill for a long time but was now in the stationary period, which I destroyed. I prepared an emulsion from the marrow of the long bones, and inoculated a calf, goat, pig, lamb, dog, and rabbit. In all, the result was negative.

V. On November 3rd, 1902, I destroyed an animal that was convalescent, and inoculated two pigs and a goat with an emulsion of marrow and synovia with negative results; also cultivations remained sterile.

When the progress of the disease remains stationary arthritis diminishes, and the intro-articular lesions cicatrise, the ulcers in the articular cartilage fill up but never resume their normal condition, the articular surfaces always remaining roughened, and sometimes greatly deformed, which probably explains the permanent lameness.

To me there appears to be but little doubt that osseus cachexia is an infectious disease capable of being transmitted by cohabitation, or living in an infected place, also by direct inoculation with virulent material, and in practice it therefore would seem advisable—

1. To rigidly isolate all animals attacked or about which there are any doubts.
2. To most carefully disinfect the piggery.

I should not advise indiscriminate slaughter, as if taken immediately treatment is often successful, but if the case is at all advanced it is useless, and only waste of money keeping the animal alive.

(*L'Echo Vétérinaire*, Liege, Belgium, July 1903.)

THE HORSE OF NORTHERN CHINA.

BY JOSHUA A. NUNN, LIEUT.-COL., DEPUTY DIRECTOR-GENERAL, ARMY VETERINARY DEPARTMENT.

In future wars there is no doubt as to the greatly increased employment of mounted infantry on small horses, and as events are shaping themselves in the Far East, the following few remarks on the horses of Northern China may perhaps be of some interest.

The horse is mentioned in the earliest Chinese records as far back as the Tcheou dynasty, founded by the Emperor Ou Ang, 255 B.C., but it was under the Tartar dynasty, founded by Tsing Che-hoang-ti, that the first improvement in the native horse took place. Those that the invaders

brought with them were larger and hardier than the aboriginal pony, and being naturally horsemen they communicated their tastes to their vanquished subjects, racing and mounted sports being one of the chief pastimes of the court and nobility. Marco Polo mentions that the Emperor, Che-teou, who reigned during the thirteenth century A.D., kept a stud of 10,000 pure white mares for their milk, which only certain privileged persons were allowed to partake of.

The Emperor Choun, of the Tsing dynasty, is said on one occasion to have received a present from certain tributary princes of 24,000 horses; and during the Tartar rule the horse was highly venerated, the favourite charger being sacrificed on his master's tomb.

The Mongolian horse is small, 12.3 to 13.3 hands high, compact and plain-looking, but stout and hardy. His characteristic points are a wide forehead, straight nasal bones, and rather a heavy head, which, however, does not lack expression, an intelligent eye, and short ears, usually pricked forward on the alert. The neck is short, and wither low, back inclined to be hollow, loins strong and wide, croup and quarters well furnished and muscular, but inclined to be goose-rumped, and tail set somewhat low down. The shoulder is short and atraight, but stands out well in relief, and the chest wide and roomy. The limbs are stout with good bone, and the tendons stand out well defined without any superfluous connective tissue round them; joints large and well formod, feet remarkably sound, and the animal generally stands and carries himself well.

The colour varies from white to black, but light gray, bay, chestnut, dun, and piebald are the most common. The action is not good, as breaking and handling are done in a very crude manner. The amble is the favourite pace; no mandarin would be seen trotting, and only soldiers gallop or canter. Those ponies that were taken in hand by the officers of the Allied Forces in 1901, greatly improved in this respect, and proved to be hardy, enduring animals.

Many Mongol ponies, however, show traces of better breeding. These animals stand about 14.1 hands high, the head is lighter, and they have a better rein; the wither higher, and the shoulder better set on and finer than the ordinary type. They have a good barrel, are stout limbed and have plenty of bone.

A large market exists at the town of Kalgan, in the province of Chilie, on the frontier of Mongolia, where the average price is about £4. The trade is in the hands of Chinese dealers, who drive them down to the coast; those likely to turn out well and be useful for racing or polo being taken into the settlements and sold to Europeans.

The Chinese pony is very quiet and docile, in this respect differing from the Indian country-bred "tatto," and on his native plains is accustomed te go in large herds. Veterinary-Major Boorges, of the French Artillery, who was employed purchasing horses for the French Government in China, was greatly struck by the ease with which a herd of two or three hundred were managed by three or four Chinese drivers and the way they let him handle them, although they had never seen a European before. An account is given in the *France Militaire* of April 23, 1903, of a long-distance ride on Chinese ponies, done by some officers of the Allied Forces on February 20, from Tientsin to Pekin, 126 kilometres, which gives good proof of their hardiness and endurance.

The competition was confined to Chinese ponies, the minimum weight

carried being 73 kilogrammes, and one of the conditions being that they had to cover 2 kilometres in ten minutes the next day. There were thirty-three entries, viz., nineteen German, six French, and six Japanese officers, and seven civilians. The weather and roads were exceedingly bad, a start being made in a storm. The average height of the ponies was 13 hands 1¼ inches, and the *France Militaire* contrasts them with the horses that competed in the 132 kilometre ride from Brussels to Ostend. It is pointed out that the time of the winner was the same as the fifth horse in the Brussels-Ostend ride, and the twentieth that of the twelfth; also that fewer failed to cover the whole distance. The winner's time was 7 hours 33 minutes, and the twenty-third 9 hours 7 minutes, and that of the last seven from 9 hours 26 minutes to 12 hours 40 minutes; four died and two stopped on the road.

(From *Baily's Magazine of Sports and Pastimes.*)

TOLERANCE TO TUBERCULINE.

M. H. VALLÉE, ALFORT.

If repeated doses of tuberculine, either daily or at short intervals, are given to tuberculous cattle the reaction is gradually less well marked, the animals becoming tolerant to it, but this toleration is very temporary.[1]

Nocard gave a second injection twenty-four hours after the first, and found that although all reacted to the first injection two-thirds failed to do so with the second. The same result took place when the second injection was deferred for forty-eight hours, but if eight days were allowed to elapse, half reacted, and if 15 days, two-thirds.

He found that practically a second reaction could not be obtained under twenty-five days or a month, and then failure to react was exceptional.

This tolerance to tuberculine is well known, and unscrupulous persons make use of it in the sale of animals.

This fraud is largely practised on the frontier, where animals are subjected to the tuberculine test before being allowed to cross. In Germany during the year 1901 41,808 were imported, and almost all slaughtered in the public abattoirs; out of these 7194 proved to be tuberculous, although on the frontier they had been tested with tuberculine and had not reacted.

In an article entitled "Steps taken against Bovine Tuberculosis in Norway," Dr. Malm says:—"Errors will take place in the case of animals that are rendered immune, but experience has shown that this immunity is temporary, uncertain, and irregular, and quickly disappears, and that such errors can easily be avoided by a few simple regulations, viz.:—Restriction of the sale of tuberculine to others than veterinary surgeons, and with them careful registration of its use. For testing at quarantine stations a large and strong dose to be used, and the cattle to be kept for a longer time under observation, which should be more strictly carried out than at present."[2]

[1] Nocard, article Tuberculine, Dictionaire Vétérinaire pratique, vol. xxi., page 449.
[2] Revue Général de Médecine Vétérinaire, vol. ii., 1903, p. 401.

Dr. Malm's remarks are no doubt sound, but in France at all events it would be impracticable to carry them out.

MM. Nocard and Roux recommend that the difficulty should be got over by using a specially energetic tuberculine on the frontier. With this they claim to obtain a typical reaction with tuberculous animals thirty-six hours after having received an injection of ordinary tuberculine.

Unfortunately dealers were not long in finding out that this tuberculine was being used, and obtained it themselves, rendering the test useless.

The question therefore arose whether there was no method by which the fraud could be detected and the tolerance to tuberculine overcome, and whether a first inoculation of tuberculine would not render a tuberculous animal sensitive to a second, so that the reaction to it or even a third would take place quicker and last for a shorter time than the first.

I have inoculated cattle a second time that had given a marked reaction previously, and I have found that if the temperature is taken every two hours afterwards there is a quick and very marked rise, whereas healthy subjects give no reaction of any sort. The following table gives some of the results that have been obtained :—

Consecutive Number.	First Inoculation.		Second Inoculation.		Consecutive Number.	First Inoculation.		Second Inoculation.	
	Reaction.	Hour after Inoculation.	Reaction.	Hour after Inoculation.		Reaction.	Hour after Inoculation.	Reaction.	Hour after Inoculation.
1	2·9	10	2·3	6	19	2	9	1·3	8
2	2·3	11	2·6	6	20	2·7	9	1·8	5
3	2·7	10	1·7	6	21	1·3	10	1	9
4	2·1	11	2·5	6	22	1·8	9	1·3	8
5	1·7	11	2·6	2	23	1·3	9	1	8
6	2·7	9	2·1	6	24	2·1	8	2·7	4
7	2·6	10	1·9	10	25	1·2	16	1·3	8
8	2·6	11	1·8	7	26	2·7	9	3·7	4
9	3·1	9	1·8	6	27	1·3	9	1·6	8
10	2·7	10	3·1	7	28	2·1	9	1·9	7
11	2·2	10	3·4	9	29	2·7	11	3·7	3
12	1·8	9	2·6	7	30	2·2	10	2·1	9
13	1·7	15	3·1	7	31	1·7	9	1·4	10
14	3·1	11	2·6	5	32	2·4	8	1	10
15	2·1	9	2·1	6	33	2·1	11	1·1	8
16	2·3	9	2	5	34	2·1	10	1·9	9
17	1·9	11	0·9	8	35	1·9	10	1·9	10
18	2	9	2·3	6	36	2·4	10	2·2	9

The second injection was made from thirty-six to forty-eight hours after the first, with a double dose of the same tuberculine.

In this series the thirty-six animals were either known to be tuberculous

or suspected from the results of the first inoculation, and with the second, given in from thirty-six to forty-eight hours afterwards, every one again reacted, the temperature being carefully taken every two hours.

The first test was made in the recognised way, thirty-two being affected without any doubt, and four suspected; with the second, twenty-eight were affected and eight suspicious. If this second test had been made in the recognised manner and the temperature not taken before the tenth or twelfth hour, more than twenty of these animals would have been passed as free from disease.

On examining the temperature charts of the second inoculation it is at once noticeable how quickly the reaction is manifest:—

At the 2nd hour	1 animal.	At the 7th hour	5 animals.
„ 3rd „	1 „	„ 8th „	7 „
„ 4th „	2 animals.	„ 9th „	5 „
„ 5th „	3 „	„ 10th „	4 „
„ 6th „	8 „		

One animal, No. 14, gave the following reaction:—

1st INOCULATION.		2nd INOCULATION.	
10th hour.	Rise in temperature 2.5°	8th hour.	Rise in temperature 2.6°
13th „	„ 2.5°	12th „	„ 0.8°
17th „	„ 3.1°	—	—

It would therefore appear that in the majority of cases there is no tolerance to tuberculine, and that almost invariably tuberculous cattle will react to a second inoculation made a short time after the first, but that the second one appears very quickly, and only lasts a very short time, and it is possible that very advanced cases act in the same way. If so, this would explain why such do not react if the temperature is only taken at the twelfth hour.

This tolerance to tuberculine, if it exists at all, is so slight that a series of reactions have been obtained at a few days' interval with both pulmonary and mammary cases, of which the four following are examples:—

	21st Nov. 1903.	25th Nov.	27th Nov.
Mammary, -	Reaction = 2.9°	Reaction = 2.3°	Reaction = 2.6°
	15th Dec.	16th Dec.	18th Dec.
Pulmonary, -	Reaction = 3°	Reaction = 2·3°	Reaction = 2°
	30th Nov.	2nd Dec.	7th Dec.
Pulmonary, -	Reaction = 3·1°	Reaction = 1·8°	Reaction = 2·6°
	30th Nov.	2nd Dec.	7th Dec.
Pulmonary,	Reaction = 2·1°	Reaction = 2·7°	Reaction = 3 8°

It seems, therefore, difficult to understand how there can be any real immunity to tuberculine even if for the primary inoculation large doses (50 grammes) are used, and it seems that it is reasonable to suppose that if due precautions are taken fraud can be detected, viz.:—To make the inoculation about five or six o'clock A.M., using double the usual quantity of tuberculine, 8 cc. for large and 4 cc. for small animals, which quantity may

be employed without fear of accident; to take the temperature every two hours up to the fourteenth or fifteenth. Any animal whose temperature rises to 1.5° should be considered affected, and between 0.8° and 1.5° suspicious.

No animal should be tested whose temperature is above 39°, and they should not be let drink for an hour previous to taking it.

(*Revue Générale de Médecine Vétérinaire*, 15th August 1904.)

TO OUR READERS.

We beg to announce that with the January number a series of Original Articles was commenced, from the pen of Lieut.-Colonel Nunn, on "Veterinary Toxicology." It is expected to publish these articles in book form at the conclusion of the series.

PART II.—SPECIAL TOXICOLOGY.

BY LIEUT.-COLONEL J. A. NUNN, F.R.C.V.S., F.R.S.E., C.I.E., D.S.O., BARRISTER-AT-LAW, DEPUTY DIRECTOR-GENERAL ARMY VETERINARY DEPARTMENT.

(*Continued from page* 190.)

Analysis.—The poison may be present in suspected food or other materials, or in the various organs of the body, liver, brain, blood, muscles, urine, or bile. If there is a large quantity, and in a soluble form, the material can be macerated in water and filtered. The filtrate will contain the lead, for which it can be tested. If the lead is in an insoluble form a small portion of the material is dried at a gentle heat, and with a carbonate of soda flux on charcoal submitted to the reducing flame of the blow-pipe, when a greyish blue metallic bead will be obtained that will leave a mark when drawn across a piece of paper. Under the oxidising flame this bead gives a yellowish pink colour—oxide of lead. The material boiled with a solution of caustic or neutral chromate of potash gives a precipitate, yellow chromate of lead.

When there are only small quantities it is necessary to destroy the organic matter. Any of the methods described for arsenic can be employed, and as lead is only slightly volatile at a white heat the manipulation is comparatively easy. There are, however, two special processes—Ellenberger and Hofmeister's, and Pouchet's.

Ellenberger and Hofmeister's method consists in reducing to a charcoal by a low heat the suspected material which has been previously dried, and then treating it first with strong, afterwards with dilute, nitric acid, which is decanted off or filtered. The residue is then heated to redness, treated with very dilute nitro-muriatic acid and filtered, the two filtrates being mixed together. They are rendered slightly acid, and treated with a current of sulphuretted hydrogen. The resulting precipitate is washed with boiling water, and dissolved

in dilute nitric acid. The solution contains lead, and can be submitted to any of the tests to be described hereafter.

Pouchet's Process.—To 250 grammes of the suspected material are added 250 grammes of nitric acid and 25 grammes of sulphate of potash, heat being applied, when a violent reaction takes place. Sulphuric acid is then added, and again heat applied till it boils, when it is diluted with water. The fluid is placed in a platinum capsule, and the positive pole of a battery placed in it. The lead will be deposited on the platinum. It is washed off, dissolved with nitric acid, and the solution divided into two portions. One is treated with sulphuric acid. Sulphate of lead is precipitated, which is washed, dried, and weighed; this multiplied by 0·68291, and then doubled, will give the quantity of lead in the material examined.

The second portion is evaporated over a water bath to get rid of the acid. The residue is redissolved in water, and the solution, as well as that obtained by Ellenberger and Hofmeister's process, can be submitted to the following tests:—

1. Potash soda and ammonia give a white precipitate.
2. Carbonate of soda gives a white precipitate, which is insoluble in cyanide of potassium.
3. Hydrochloric acid gives a dense white precipitate—chloride of lead, soluble in excess of hydrochloric acid and boiling water.
4. Sulphuric acid gives a white precipitate sulphate of lead, which blackens with sulphuretted hydrogen.
5. Dilute solution of chromate of potash gives a yellow precipitate—chromate of lead, soluble in excess of potash.
6. Iodide of potash gives a yellow precipitate—yellow iodide of lead, soluble in boiling water.
7. A slip of zinc or magnesium placed in the solution precipitates the lead in crystals in the form of a blackish grey film over it.

Quantitive Analysis.—The lead is converted into sulphide, sulphate, or bioxide:—

1. The acid solution is evaporated, and the residue treated with a saturated solution of acetate of soda, a current of sulphuretted hydrogen being passed through it. The precipitate is filtered, dried, and heated to redness with sulphur, forming sulphide of lead, which is weighed.
2. The acid solution is treated with excess of sulphuric acid, the precipitate washed in dilute alcohol, dried, and weighed.
3. This method is known as Riche's. Salts of lead in a solution of nitric acid form a bioxide under a negative current, and an ordinary Bunsen cell will deposit about two grammes in twelve hours. To prevent the compound from being redissolved, the liquid should be syphoned off at the end of the operation without interrupting the current. The vessel in which the operation has

taken place should be washed with distilled water, dried, and weighed; the difference will represent the quantity of lead. It is best carried out at about 60° Centigrade.

MERCURY.

Metallic mercury is not poisonous; indeed at one time large doses, amounting to pounds weight, were given in the human being in cases of bowel obstruction, with the object of overcoming it mechanically.

Malicious poisoning is rare in animals, but accidental is by no means uncommon. Mercury gives off a small amount of vapour, even at an ordinary temperature, and animals living in the neighbourhood of works and mines suffer from the effects, a notable case being mentioned by Finlay Dun as having occurred in Italy, where not only the workmen and animals employed in the mine were affected but even fish in a neighbouring pond.

The oxides are poisonous, but chiefly the yellow, which enters into the composition of paints, has generally been the cause of accidents. The sulphides, which occur native in the form of cinnibar, are not very toxic on account of their insoluble properties, but Dr. Bennett mentions a case of a dog that became affected with chronic mercurial poisoning from a habit of licking vermilion oil paint. Mercurous chloride or calomel is very slightly soluble, and not likely to cause accidents, but small doses constantly repeated have produced hydragism. Miahle is of opinion that it is altered into bichloride of mercury (corrosive sublimate) in contact with alkaline chlorides, but this is not supported by MM. Adam or Guinard; and Voit considers that it is absorbed as an albuminate.

Thiocynate of mercury, which is the basis of the scientific toy known as Pharaoh's Serpents, is a very toxic salt, and possibly might be formed in the organism if calomel was given in conjunction with a decoction of bitter almonds, which contains hydrocyanic acid.

The usual cause of poisoning is chloride of mercury or corrosive sublimate, which being largely used for disinfectant purposes may be easily mistaken for other harmless substances, particularly as it is colourless in solution and inodorous.

Toxic Doses.—The dose tolerated is variable, appearing to depend a great deal on individual idiosyncrasy and tolerance acquired by habit. Birds and ruminants appear to be peculiarly sensitive, probably from the poison being retained in the crop and first stomach, and being more certainly absorbed. Bouley and Hertwig caused the death of a horse by the application of mercurial ointment to the skin, but only after the expenditure of several kilogrammes and the lapse of a month; whereas Lafosse poisoned an ox with 100 grammes, and Warnessou caused symptoms of poisoning by injecting 1 gramme of corrosive sublimate in 15 grammes of alcohol into the udder of a cow. Kaufmann places

XUM

the degree of intolerance to mercury of animals as—birds, cats, sheep, ox, pig, solipeds, and the toxic doses of corrosive sublimate—

Ox,	4	to	8	grammes.
Horse,	8	to	10	„
Dog,	0·25	to	0·50	„

Hertwig found that 7 to 8 grains killed dogs in from 7 to 30 hours, 4 drachms horses in 12 hours, 2 drachms cattle in 14 days, and 1 drachm sheep in 12 hours.

Law's Veterinary Medicines give the toxic dose as—horse 2 drachms, ox 1 to 2 drachms, dog 4 to 6 grains.

Calomel is not so irritant as corrosive sublimate, but Hertwig found that in horses 3 to 4 drachms, cattle 2 to 3, sheep 15 to 30 grains, and dogs 6 to 30, caused in 24 to 36 hours colicky pains with purgation, there being a large quantity of bile in the fæces, which were of a greenish colour. If these doses were repeated for three or four days there was a fatal result, with the usual symptoms of mercury poisoning. Cogswell reports a case of a setter that died from a drachm of iodide of mercury in five days.

Absorption.—Mercury before it can be absorbed has to be converted into a soluble compound, and although the exact nature of this process is not properly understood, it would appear that the chloride and albuminoids in the stomach and intestines play an important part as well as the hydrochloric and lactic acids, which act on the metal and form lactate of mercury. Berthelot has shown that at an ordinary temperature it unites with the oxygen of the air and forms an oxide, and that this process can be carried out in the stomach, also that the chlorides present acting on it form a double chloride, but nevertheless the absorption of metallic mercury takes place very slowly and a large proportion is passed off in the excrements. Alkaline carbonates would appear to act on calomel to form oxide of mercury and the double chloride.

Mercury is absorbed into the blood and is found in the metallic form in the bones[1] and various tissues. When contained in an ointment it is as well to remember that if this has been made for some time absorption will take place quicker than if it is fresh. Voit points out that metallic mercury is absorbed slowly, protochlorides and mercurous salts more rapidly, and bichloride and mercuric salts the quickest of all.

Circulation, aspiration, and elimination.—Mercury in combination with albumen is dissolved in the blood by the action of the chlorides. Voit points out that by repeated washing it is possible to eliminate the chlorides from a compound of mercury and albumen, and therefore it must be as a protooxide and not a chloride that the former unites with the latter.

Once entered into the circulation mercury is not directly elimi-

[1] Hufeland's Journal, f. pr. Heilkunde, vol. ii., page 117; Virchow's Arch., f. Path. Anat., vol. xviii., page 364.

nated from the body, as it is deposited in most of the tissues, the liver and kidneys being the chief, but it is also found in the muscles, brain, &c. Reederer administered to a dog in 30 days 2·789 grammes of calomel divided into 68 doses, and found the following proportions in the tissues in the form of sulphide of mercury :—

Brain, heart, lung, spleen, pancreas, kidney, testicles, and penis, - - - - - -	0·009
Liver, - - - - - -	0·0114
Muscles, - - - - - -	0·0114
During life in fæces, - - - -	2·1175
„ urine, - - - -	0·0550

Drogendorff[1] gave a dog in 78 days 1·709 grammes of calomel in 69 doses; 0·1084 were eliminated in the fæces, 0·0467 in the urine; the experiment was continued for 24 days, the figures during this period being 0·0563 and 0·009. The animal was then destroyed; the liver only contained 0·0026, and the muscles scarcely a trace. The facility with which mercury is deposited is an important point in the changes undergone by the excretory organs that have an affinity for it.

Elimination takes place in the urine,[2] bile, perspiration, saliva, and fæces in the form of a double chloride combined with albumen, but it is slow, and in chronic cases the metal has been detected in the liver months after any contamination could have been possible. The alkaline iodides assist elimination in the same way as they do lead.

Symptoms.—Acute: If a considerable dose of corrosive sublimate is taken, the symptoms will be those of acute gastro-enteritis, complicated with those caused by the corrosive action of the poison, to the exclusion of any other special ones. There will be nausea, and if capable of vomiting, a quantity of bilious mucus ejected, which afterwards is tinged with blood; acute colic and diarrhœa, at first bilious, afterwards tinged with blood, and fœtid. The pulse is small and quick, and the animal dies in a few hours in a state of collapse.

Should the amount taken be of a smaller quantity, and the course of the attack not be so violent, the special symptoms due from the presence of the poison in the circulation will present themselves. It is immaterial by what channel they gain access to the circulation, *i.e.*, whether by the mouth or through the skin, but they will manifest themselves sooner or later, according to the degree of rapidity with which they are absorbed. If the dose is given by the mouth the acute symptoms described will be seen, but in a milder degree.

This form of mercurial poisoning is usually seen in cattle, and

[1] Manuel de Toxicologie, 1866.
[2] Schmidt. Elimination des Quicksilbers. Dorpat, 1879.

the first symptoms appear in about eight days after the poison has been taken. There is salivation, which is glairy and ropy. At first it is not very profuse, and is swallowed, but later on it runs from the corners of the mouth and hangs in long threads. The mouth, gums, and sometimes the tongue, are red and swollen, often covered with a yellow-coloured fur, and bleeding. At the same time there may be stomatitis and characteristic mercurial ulceration. The teeth become loose, fall out, and the breath and saliva have a peculiar fœtid smell. The respirations are painful, loss of appetite, and rumination is suspended, also the secretion of milk. The urine is scanty, and frequently albuminous, pulse small and irregular, and in many cases œdema of the limbs and dewlap. There is a peculiar muscular twitching, and partial paralysis (mercurial paresis), eczema of a peculiar type is seen, characterised by the formation of small abscesses, which burst, leaving behind them indolent ulcers that heal slowly, and there is often epistaxis. Death usually takes place in from eight to fifteen days. The same symptoms and course of the attack are seen in the other animals,—in cat, dog, and horse.

Chronic.—The symptoms of chronic mercurial poisoning much resemble those of acute, except that they are longer in making their appearance, and come on more gradually. There is very often a diminution in the secretions, urine, milk, synovia, and perspiration. After the lapse of a certain time there is progressive anæmia, and the animal sinks into a state of profound cachexia, with great weakness, chronic catarrh of the mucous membranes, which are blanched, œdema of the dependent parts of the body, and easily excited hæmorrhage. There is also excessive nervous irritability which is characteristic, and which shows itself in muscular tremors and twitching of the limbs. These tremors are more violent during motion, and seem to extend themselves more to some particular groups of muscles than others. Animals suffering from chronic mercurialism will live for a considerable time,—even months.

Post-mortem.—The local lesions have nothing specially characteristic about them; indeed they differ, depending on the nature of the compound, the form in which it is applied or given, dose, and channel of introduction.

If the mercury is in a soluble form there is corrosion and inflammation of the surface it comes in contact with. If it is corrosive sublimate taken by the mouth there is violent diffused gastro-enteritis, in itself sufficient to cause death, the mucous membrane is highly injected, infiltrated, covered with patches of ecchymosis, and in places ulcerated and gangrenous. Taylor mentions a case in a human being in which there was perforation; but this violent gastro-enteritis cannot be considered as a characteristic lesion of mercurial poisoning. The local effects are usually not so acute, and are subsidiary.

Acute Poisoning.—When the poison is soluble there is irritation

and inflammation of the mouth, œsophagus, stomach, and intestines, but if it is insoluble there may be no local lesions at all.

Mercury when absorbed into the blood causes certain changes in it that are not properly determined. It is black, very fluid, does not clot, and according to Senger contains a considerable quantity of lactic acid.

An important lesion is the existence of a diphtheritic inflammation, with the formation of false membranes in the intestines, especially the large. This is due to the mercury in the circulation and not from local action, as it has been seen when the poison has been absorbed through the skin. Grawitz established an artificial anus in the dog, opening the cæcum ; the animal was then poisoned with mercury, and all the usual diphtheritic lesions were present in the intestine behind the artificial anus.[1]

The liver is usually enlarged and of a pale colour. The kidneys, and in some cases the voluntary muscles, undergo fatty degeneration.

The kidneys, which are the chief organs by which elimination takes place, present the appearance of parenchymatous nephritis. In the earlier stages there is effusion, especially round the glomeruli, with which there may be extravasation of blood. The lining epithelium in the convoluted tubes is tumefied, necrotic, and in places has undergone fatty degeneration. It is frequently displaced, and blocks up the tubes with casts. Salkowski[2] has shown that these casts may consist of calcareous material, and he has been confirmed in his observations by Bouchard, Carnil, Prevot, Virchow, and Senger. The latter gives the following explanation:—The lactic acid in the blood dissolves a portion of the lime salts in the bones, in the form of lactate of calcium. This is converted into a carbonate in the blood, and is eliminated in the urine, but when the secreting function of the kidney is interfered with it lodges in the tubes. To the naked eye the kidneys are pale and of a yellow colour, especially in the corticular portion. The extreme fluidity of the blood gives rise to passive congestion and hæmorrhage into certain organs, especially the lungs, heart, and brain, and the long bones are in a measure decalcified ; indeed they sometimes are flexible.

Chronic Poisoning.—There is stomatitis and ulceration of the mouth, which may run on into necrosis of the bony structures. The gastro-enteritis takes the form of a chronic catarrh, and is confined to the large intestine, the mucous membrane of which is infiltrated and of a slate colour.

Letulle points out that in mercurial cachexia in portions of the peripheric nerves the myeline is broken down into minute particles, which are reabsorbed, leaving the sheath of Schwann empty but the axis cylinder intact, though there are no signs of inflammation, as is the case in lead poisoning. If the case has been going on for any length of time there are all the usual appearances of advanced cachexia.

[1] Grawitz. Deut. Med. Woch. 1888.
[2] Salkowski. Virchow's Archives, vol. 37. 1888. Page 348.

XUM

Reviews.

THE DISEASES OF THE MAMMARY GLAND OF THE DOMESTIC ANIMALS. By P. LEBLANC. Translation by Lieutenant-Colonel J. A. NUNN, C.I.E., D.S.O. London: Baillière, Tindall & Cox. Number of pages xii. 111. Illustrations 32. Size Royal 8vo. Price 3s. 6d. net.

This small but important and useful work commends itself to practitioners, particularly from the nature of the subject treated; and this translation of Leblanc's book into English will no doubt be of considerable use and interest in actual practice. After two introductory chapters of notes on the comparative anatomy and physiology of the gland, the diseases of the organ are treated of in groups under the headings of injuries, acute mastitis, chronic mastitis, and tumours. Under each heading, ætiology, symptoms, pathology, and lines of treatment are indicated, and the conditions in each of the domestic animals are compared.

The subjects of injuries and acute mastitis are very fully treated, and the various classifications of different authors of the forms and causes of acute mastitis are presented in a way which give the reader a very fair and complete conception of the subject.

The last two chapters, however, on chronic mastitis and tumours of the gland are not so thoroughly dealt with as the previous ones. In these days the practitioner will at once turn to the chapter on chronic mastitis—that form of disease of the udder in which he most requires help and guidance, and which gives him most trouble in his practice. The space devoted to this subject is only less than half that occupied by "acute mastitis."

The subject of tumours is treated of in a way which will be easily understood, but a more modern and scientific classification and description of tumours would have rendered the work still more useful.

Throughout the text of the work are several semidiagramatic illustrations, which considerably assist the reader.

MANUAL OF THE MORE DEADLY FORMS OF CATTLE DISEASE IN INDIA. By Col. J. H. B. HALLEN, Indian Veterinary Department. 3rd Edition, by Capt. C. K. WALKER, Indian Civil Veterinary Department. Published by Indian Government, Calcutta, 1904. Price 9d.

The original pamphlet was published by the late Col. J. H. B. Hallen, Indian Veterinary Department, in 1871, and translated into many of the Native languages. These were the dark days of veterinary science in the East, and the pamphlet was written to give both English and native civil officers some slight glimmerings as to the nature of the epidemics that sweep the country, and bring devastation and famine in their train. The small book at the time was the only one in existence, and it did good and valuable service; but within the last ten years the establishment of veterinary schools for the education of natives has thrown light into the dark places. In Northern India, at all events, some of the leading works on veterinary medicine, "both English and Continental," have been translated into the vernacular by the native teachers of the Punjab

Veterinary College, and we believe the same has been done in other parts of the Empire.

The Manual is, as we know from personal experience, useful, especially the headings of the native names, which enable the district officer to recognise from reports what diseases are prevalent.

HANDBOOK OF MEAT INSPECTION. By ROBERT OSTERTAG, M.B., Professor in the Veterinary High School in Berlin. Translated from the German by E. VERNON WILCOX, M.A., Ph.D., Veterinary Editor, Experiment Station Record; and Introduction by JOHN R. MOHLER, M.A., Chief of the Pathological Division, United States Bureau of Animal Industry. Bailliere, Tindall, & Cox, 8 Henrietta Street, Covent Garden, 1904. 1 vol., 884 pages. 259 illustrations, and 1 coloured plate. Price 31s. 6d.

Dr. Ostertag's work is the standard one on the subject in Germany, the original one in his native language having run through seven editions.

In Germany meat inspection is much more strictly carried out than in England, and the law on the subject has been codified in the Imperial law of June 3rd, 1900, concerning the inspection of food, animals, and meat. The author has summarised this law, together with the other most important legislation on the subject down to 7th April 1869.

The introduction by Mr. Mohler gives a summary of the history of meat inspection, and a most lucid description of the system adopted in America, particularly as regards preserved meats in Chicago, where, as every one knows, the industry is carried out on a gigantic scale, and is reduced to a science. 411 inspectors, all of whom are qualified veterinary surgeons, are employed, and 233 skilled microscopists. In all 1405 persons are employed by the State.

It would be impossible to enter into a full description of Dr. Ostertag's work; suffice it to say that all known conditions that render meat unfit for human food are discussed fully, and, in addition, there is a chapter on fish, and the destruction and sterilisation of condemned carcases.

The work is a monumental one, and we are confident will hold its own for years to come. The translator is to be congratulated for placing such a masterpiece at the command of English-speaking veterinary surgeons, and deserves the thanks of the profession.

The plates are life-like and letterpress good. The book is worthy of the enterprising firm who have published it.

VERÖFFENTLICHUNGEN AUS DEN JARES VETERNAIR BERICHTEN DER BEAMTETEN THIERÄRZTE PREUSSENS FÜR DAS JAHR 1902. Extracts from the Prussian Veterinary Sanitary Report, 1902. 2 Vols. Published by PAUL PAREY, Berlin. Price 10s.

THE Report for 1902 is on the same plan as those of former years.

1. *Diseases notificable.*—The charts at the end of each chapter have been most carefully prepared, and show at a glance the progress of disease in each division of the country, Departments, Arrondissements, Communes, and Farms, each being shown by a different coloured line,—Red for Farms, green for Communes, straight black for Arrondissements, and dotted black for Departments.

XUM

The first chapter deals with anthrax. Vaccination after Pasteur's plan has given good results. Most German veterinary surgeons recommend the burning of the body as the only safe way of disposal in spite of the cost.

Black-quarter decreased very much in 1901. Vaccination is only reported upon by two veterinary surgeons, but their results have been good. Gangrenous septicæmia or malignant œdema caused great loss in the Rhenish Provinces, so much so, that the Rhenish Provinces Live Stock Association endeavoured to have it classed with black-quarter for compensation. This was refused by the Government on the ground that it was preventible if proper measures were taken.

Rabies increased slightly in 1904. Bermbach, who took charge of the Berlin Pasteur Institute in 1902, publishes some statistics. In 1902 333 persons were bitten by dogs suffering from or suspected to be rabid, 4 of whom died on the 93rd, 95th, 103rd, and 143rd day after treatment. Bermbach proposes that persons badly bitten on head, body, or hands should go through a second course a month after the first. At Berlin the treatment lasts for 21 days, and the dose is the same for children and adults.

Glanders show a decrease, thanks to the more widely spread use of mallein. General veterinary surgeons have used French mallein instead of Foth's, which is generally used in Germany, and find it more reliable and regular in its action.

Foot and Mouth disease has been prevalent, numerous agents have been used in its treatment with negative results, except pyoctanine, which in the hands of Professor Eggeling has been of service. As a prophylactic, Löffler's method of vaccination has been highly spoken of in some quarters.

Contagious pleuro-pneumonia has shown a marked decrease, due to the systematic inoculation of herds exposed to contagion.

Contagious vaginal catarrh in cows is greatly on the increase, and legislative measures are required. The insufflation of the vagina with a powder composed of 4 parts of sulphate of zinc and 1 boracic acid has given the best results. The irrigation of the vagina and use of antiseptic tampons have also been beneficial.

Sheep Scab.—Dipping has been unanimously recommended in preference to any other method. Bermbach does not think any one preparation superior to another; they are all invaluable if properly employed.

Scarletina in pigs has increased in spite of vaccination. Bermbach attributes this to want of care in operating, which is frequently done by ignorant persons, and the disease spread. The authorities recommend more care and supervision in the distribution of the serum.

Swine fever has increased. Vaccination with Wassermann and Ostertag's polyvalent serum is recommended especially for young pigs, but it is no use as a curative.

Fowl cholera has decreased.

Fowl plague is a new disease, and has been scheduled in the sanitary law of the German Empire. It has caused great loss during the spring and summer, but, contrary to fowl cholera pigeons, are not attacked. The specific organism has not yet been isolated.

2. The second volume treats of epizootic and enzootic diseases that it is not obligatory to report, and several matters deserve special mention. In speaking of *strangles* mention is made of numerous drugs and agents, but Bermbach abstains from giving any opinion on their use except collargol and bear yeast, the latter mixed in the food.

The campaign against *tuberculosis* is being vigorously pushed by the German stockowners. Professor Ostertag, Director of the Hygienic Institute of the Berlin Veterinary School, proposes a series of most stringent prophylactic measures to stamp out the disease in a measurable space of time.

Amongst these he recommends that calves should from their birth be separated from adults and kept in stables only, and by horses or sheep, measures being taken to avoid all extraneous contamination. They are to be fed with milk heated to 85° Cent., and later on submitted to the tuberculine test, so that only healthy ones may be used for breeding purposes. Adult cattle should be frequently inspected and reported upon to the local authority, where they should be registered, and the owner compelled to send to the butcher as soon as possible any one in which tuberculosis is detected either by clinical, bacteriological, or the tuberculine test.

By these means Ostertag considers that gradually but certainly centres of contagion would be eliminated, at the same time a healthy breeding stock would be reared up. It is feared, however, that this plan is unworkable.

The treatment of milk fever by Schmidt's plan is recommended by Bermbach. Most German practitioners now-a-days condemn the use of iodide of potassium, and several have attributed ill results to it. On the contrary they are all in favour of the insufflation of air combined with the hypodermic injections of caffeine either alone or in conjunction with salicylate of soda. The action of the caffeine is to stimulate the heart.

In regard to meat inspection Bermbach mentions with satisfaction the extension of the Freibanke to the majority of the public abattoirs.

Milk inspection is making progress, and is regularly carried out in most large towns, but the regulations require careful watching as to their efficiency in view of the sciences brought into the trade.

Knacker yards, it appears, are not sufficiently cared for, and fresh legislation is required regarding them.

This illustration shows the "Reliance" Tooth Rasp, which is manufactured by Messrs. Arnold and Sons, of West Smithfield, only with some improvements made at my suggestion, which now makes it a most perfect rasp. Instead of the old fastening which projected and caught the teeth when in use a flush screw joint is used, and is so arranged that, by a few turns, only one-half of the upper part of the frame comes out, thus enabling one to change the plates quickly. Again the plate is made curved instead of straight, and the joint at the end of the frame which received the plate is made flat and the top rounded so that there is no possibility of lacerating the gums of restive horses during the operation.

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ANTIPHLOGISTINE.

The use of damp heat has been known as a remedial measure from prehistoric times, and has been applied to the surface of the body in many ways, chiefly by fomentations and poultices. The former, however, requires a considerable amount of skilled attention; the latter for various reasons is unsatisfactory, and has been superseded.

A poultice is likely, if neglected, to turn into a sour, putrid mass, is irksome to the patient, and difficult, if not impossible, to apply in many situations. Amongst the rural population there is a firm belief in the occult virtues of different substances when used for this purpose, and in old works we find turnips, carrots, linseed, and other things recommended for different diseases, and although in the case of human beings such abominations have been relegated to the limbo of the past, unfortunately they still retain their popularity for animals.

Of the many substitutes that have been proposed up to the present spongo-piline, moss, and cotton wool packing have perhaps been the best, but lately an American preparation, "antiphlogistine" has been brought out, which has been well spoken of in this country as well as in the United States.

The preparation is a paste made up of a silica compound about the constituency and appearance of ordinary putty, and is spread over the part after the hair has been removed.

From its adhesive properties it can be applied where it would be difficult to keep on a fomenting cloth or poultice, and being antiseptic, requires but little attention. For application to the chest and throat in canine practice we have found it most useful; also to the udder in cases of mammitis in cows, for which purpose it has been extensively used in the United States.

Notes and News.

University of Manchester.

The new Public Health Laboratories are now approaching completion, and will be ready for lectures and practical work in public health on Friday, the 14th of October. The courses in Veterinary Hygiene will start on Monday, the 18th, at the same Laboratories.

Communications, Books, Journals, &c., Received.

Agricultural Journal (Cape of Good Hope); Berliner Thierärztliche Wochenschrift; La Clinica Veterinaria (Milan); Deutsche Thierärztliche Wochenschrift; Tannoform in Veterinary Medicine (March); The Sanitary Journal; Scottish Medical and Surgical Journal; Veterinary Record; La Riforma Veterinaria; Le Mois Scientifique (Paris); L'Echo Vétérinaire (Liège); Annales de Médecine Vétérinaire (Brussels); Johns Hopkins Hospital Reports; Journal of Comparative Medicine and Veterinary Archives; Recueil de Médecine Vétérinaire; Gazette Médicale de Paris; Modern Medicine; Johns Hopkins Hospital Bulletin; Il Veterinario di Campagna (Moncalleri); Le Bulletin Vétérinaire (Orleans); Revista de Medicina Veterinaria (Bucarist); La Revista Veterinaria (Buenos Aires); Zeitschrift für Fleisch und Milchhygiene (Berlin); Buletinul Societatii de Sciinte diu Bucuresci-Romania; The Meat Trades Journal; The Dental Record.